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CORRELATION BANDWIDTH MEASUREMENTS OVER TROPOSCATTER PATHS

FINAL REPORT

[redacted]

Richard Branham • Arnfinn Manders • David Kennedy • Barbara Brummett • William Guy • Robert Reinstatler

JUNE 1970

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For

U.S. ARMY ELECTRONICS COMMAND, FORT MONMOUTH, N.J.

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SUMMARY

A theoretical and experimental study of correlation bandwidth over troposcatter paths was made over a seventeen month period from February 1969 through June 1970. The field test program consisted of experiments to determine cross correlation coefficient versus frequency separation and fade characteristics over four different troposcatter paths in the northwestern region of New York State. X-and C-band signals were transmitted simultaneously using a common antenna from the RADC Test Site in Model City, New York, to Ontario Center, New York, to Whitford Field near Weedsport, New York, to Point Petre, Ontario Canada (over water), or to Port Byron, New York. Each of the paths were of different characterisitcs so that the effect of terrain and path length could be assessed. The receiving instrumentation was located in a mobile trailer and moved from site to site every several weeks to provide seasonal variations. The resulting data were recorded on magnetic tape for computer processing at the Martin Marietta computer facility in Orlando, Florida. The output information consisted of simultaneous X-and C-band measurements of cross correlation coefficient versus frequency separations up to 9 MHz and statistics of fade rate, fade duration, fade depth, and signal amplitude distributions.

The data from the field test program showed that the correlation bandwidth of the X-band signals and the C-band signals were about the same. Therefore, the same order of frequency diversity is obtainable in the same bandwidth at the higher frequency if 10 foot antennas are used over these paths which are typical of the MALLARD troposcatter links. There is, of course, the expected additional path loss and the medium-to-aperture coupling loss of the associated antennas. The fade rates, durations, etc., were also studied. It was found that the fade rates were sometimes enormous and beyond the measurement equipment limitation of about 60 Hz. As expected, the X-band fade rates exceeded the C-band rates in proportion to their frequencies. The durations and other statistics are best described as typical of what would be expected from existing theory.

In the theoretical study a literature search was made and a theoretical model for the prediction of correlation bandwidth in terms of identifiable parameters was constructed. Several models were studied. It was determined that all models appear to agree reasonably well if a suitable scale factor is included. A Gaussian model was constructed of the form:

$$\rho = \exp\left[-(Sf\,\Delta)^2\right]$$

where: ρ = the envelope cross correlation coefficient for a frequency displacement of f Hertz

Δ = the multipath spread in seconds

and S = a constant.

This particular model is convenient because it uses the simple exponential form that can be handled mathematically in other equations where ρ is a factor. The term Δ is calculated from a computer program that traces the upper and lower rays of the troposcatter effective beamwidth through the atmosphere to determine the difference in the two paths and, hence, the multipath spread. The effective beamwidth was assumed to be up to one half the scatter angle in the original model.

A comparison of data from the field test program showed that S was not originally a constant, but varied considerably from one path to another. Further study indicated that the effective beamwidth used in the ray tracing computer program was itself a function of the scatter angle rather than simply one half of it. Using the field test data obtained from the four paths, an empirical function was determined from which the effective beamwidth could be calculated. This function when applied to the ray tracing technique to determine multipath spread resulted in a constant value for S in the model. This empirical model yields good agreement with the observed data.

It was particularly noted that the correlation coefficient versus frequency separation was stationary only for short periods. From one 15 minute test to the next the measured correlation bandwidth may move through factors of easily 2 to 1. From this it is postulated that two mechanisms cause scattering; one of these is turbulent and the other is a more stable layering phenomenon. Furthermore, it is believed that varying combinations of the two scattering mechanisms are actually the result of what is seen at the receiver. The narrowest correlation bandwidths appear to be due to turbulent scattering in an unstable common volume, while the wider correlation bandwidths might be attributed primarily to the layering phenomenon.

For comparison, some of the correlation coefficient data obtained from a previous MALLARD troposcatter program is included herein. This added data is from the ECOM link between the Hexagon and Tobyhanna, Pennsylvania, which is a low scatter angle, 100 mile path.

The appendices contain the Rochester weather data obtained for the period of testing. Also included is the correlation bandwidth computer program listing which is written in FORTRAN for the IBM 360 computer. A study of the Bello Model for correlation bandwidth is included and applied to these paths. It was found that the Bello Model did not fit the observed data very closely although it appears to be a very good theoretical development. A complete test log is included for reference purposes.

I. PROGRAM OBJECTIVES

Project MALLARD is a program for the design and development of a digital, automatically switched communication system for the field Army with characteristics as described in the project MALLARD Quadripartite, Communications Plan, and Proposals for Research and Development. This digital system will be designed to transmit full duplex voice, teletype, facsimile, and digital data at various speeds with total traffic security. The communication links between points will use many different devices such as cable, microwave, radio, etc., as appropriate for the particular link. Troposcatter paths up to 200 km nominal are to be used in areas where direct cable or simple microwave systems are not applicable.

The objective of this program was to obtain data necessary for the design of troposcatter modems for use in future MALLARD troposcatter systems. In support of this objective, propagation data were collected over four types of troposcatter paths to empirically determine cross correlation versus frequency spacing and other fade statistics. These data provide a basis for determining the maximum bit rates that can be satisfactorily transmitted by frequency diversity methods with a stated error probability under known conditions of path length, path terrain, season, antenna size and beamwidth, radio frequency band, occupied bandwidth, radiated power, and frequency spacing. These data are also directly applicable to the prediction of space diversity maximum bit rates at stated error probabilities since the correlation bandwidth and fade statistics directly affect the error probabilities and bit rates obtainable.

The propagation data were collected through the use of a fixed C- and X-band transmitting system located at the RADC troposcatter test site at Model City, New York. The receiving instrumentation was located in a special van that was moved to various locations to provide variations in terrain, path length, and season.

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II ANALYTICAL MODEL FOR THE CORRELATION BANDWIDTH

A. SUMMARY AND CONCLUSIONS

As part of this program, an empirical model for the correlation bandwidth* has been developed based on the subsequently presented experimental data. As an aside, this development has entailed a study and comparison with generally accepted models of the troposcatter channel, particularly those proposed by Booker-Gordon[1], Friis-Crawford-Hogg[2], Rice[3], Sunde[4], and Bello[5].

The model proposed here, being empirical, is believed valid for paths similar to those included in the field tests, that is, paths in the range 140 to 200 km (85 - 125 statute miles). For longer paths an extrapolation is possible and the model's validity has been ascertained for a few cases for which data were available.

One problem in predicting correlation bandwidth that has been insufficiently addressed in the past lies in the marked time variation in the correlation function for a specific link. The correlation bandwidth is inversely related to the multipath spread and experimental evidence points to the fact that this spread is normally not constant for more than a few hours. Over a fixed path this variation must be due to changes in meteorological conditions, particularly in the common volume. At times it appears that the scatterers in the common volume are in turbulent motion so that the entire geometrical common volume produces effective scattering. At other times there is evidence of strongly refracting horizontal layers restricting the size of the common volume and consequently the multipath spread. Turbulent scattering would then result in a correlation bandwidth small in comparison with the case of stratified layers.

It has been experimentally determined that the correlation function can be modeled as Gaussian with variance differing by a factor of about 2.5 for the two extremes of turbulent and layer scattering. Thus the approach has been taken of obtaining the correlation function for the turbulent case with an adjustment of the variance for the stratified case. The median correlation bandwidth falls between these two bounds. It is argued that turbulent scattering corresponds experimentally to the observed lower deciles while layering predominated in the upper deciles.

When no pronounced layers are present, the behavior of the link can be accounted for by changes in the gradient of the radio refractive index.

---

*Defined here as the frequency separation at which the envelope correlation ρ_e is 0.4.

This point has been investigated in detail and computed tables that allow estimation of the frequency correlation function for a proposed link on the basis of the surface refractive index N_s have been investigated. Furthermore, equations are given that allow N_s to be computed from readily available meteorological data such as temperature, pressure, and relative humidity. The presence of layers is not easily predicted from surface values of N_s and will depend on sonde data.

In addition to affecting the take-off angles at the receiver and transmitter sights, the terrain is important in its effect on the gradient of radio refractive index. Since this gradient can be estimated from N_s, the terrain becomes important in its bearing on local weather conditions and therefore N_s.

The scatter angle has been found to be the single most important parameter in predicting correlation bandwidth lower deciles. The actual antenna beamwidth is believed to have only a minor significance and in its place the concept of effective beamwidth has been introduced. It is defined in terms of the scatter angle. For practical links, the effective beamwidth is generally smaller than the actual half power beamwidth.

B. CORRELATION BANDWIDTH EXPRESSIONS OBTAINED FROM PREVIOUS SCATTERING MODELS

The operation of troposcatter radio communication systems depends on electromagnetic energy scattered by the earth's troposphere due to inhomogeneities in its dielectric constant. The frequencies used for transmission are typically in the 1 to 8 GHz range. For these frequencies, it is relatively easy to construct narrow beam antennas. Figure 1 shows a typical troposcatter link with all relevant parameters defined. In Figure 1 it has been assumed that the antennas are located at ground level and that there are no obstructions along the horizon. The center of the antenna beams would normally be slightly elevated above the horizon.

Active theoretical investigation of the troposcatter mechanism started in the late 1940's with work by Booker and Gordon[1]. They postulated a model involving isotropic turbulence in the common volume as the scattering medium. Based on this model they and others developed theories of expected channel behavior.

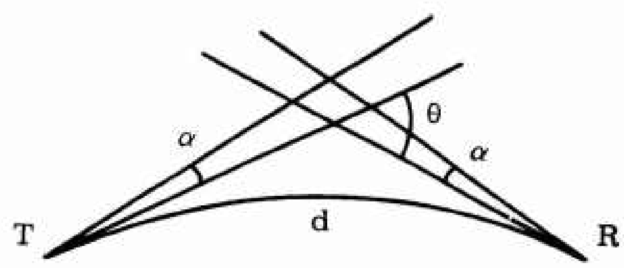


Figure 1. Troposcatter Link Geometry

A convincing model was subsequently developed by Friis, Crawford and Hogg[2] in which horizontal layers with sharp transitions in the gradient of the dielectric constant were postulated. This model is realistic in that the majority of wind induced air currents will tend to flow parallel to the earth's surface and thus often lead to horizontal layer formation.

It is to be expected that the Booker and Gordon model will apply when the troposphere is well mixed, as it may be on a summer afternoon, while the Friis, Crawford and Hogg model will apply when the troposphere is strongly stratified. This condition is more likely to occur during the winter. The first interim report[6] gave a comparison of the Booker-Gordon and Friis-Crawford-Hogg scattering theories.

The correlation bandwidth of a fading radio channel is a measure of the usable bandwidth of the channel. It also indicates how far apart in-band frequency diversity channels must be spaced to obtain substantial diversity gain.

The troposcatter channel suffers from two kinds of fluctuations. One fluctuation is rapid fading caused by the random motion of the scatterers. This fading has a typical time scale in fractions of seconds. Another fluctuation is a slow variation that follows variations in weather, day, and season. The averaging time for measurement of the frequency correlation function must be chosen to include many rapid fades, but not so great as to cover a substantial period of the slow fluctuations. A range of suitable averaging times is from 2 to 10 minutes.

The frequency correlation function is related mathematically to a more easily visualized function, the multipath spread. The multipath spread is the time elongation an ideal impulse would suffer if transmitted over the channel. If the multipath spread for the channel can be determined, the correlation bandwidth can be calculated from it. As shown in Figure 1, it appears to be a simple matter to determine the maximum multipath spread. It is only necessary to evaluate the difference in propagation delay between signals arriving via the top and bottom of the common volume. However, this approach proves quite inaccurate since radio waves do not travel in straight lines in the troposphere. Furthermore, since the power transfer is a sensitive function of the scatter angle, the effective common volume will in general be smaller than the geometrical one. It appears that the multipath spread is a function of both the path length and scattering angle, but evidence gained here and elsewhere indicates that it does not depend very strongly on antenna beamwidth. Experimental results have shown only a small change in correlation bandwidth of a 4 GHz link as the receiving antenna diameter was changed from 8 to 60 feet[7].

In the theoretical models developed by S. O. Rice[3] and also by Hirai, Fukushima, and Kurihara[8] it was assumed that the scatterers were randomly distributed throughout the common volume according to a three dimensional Gaussian probability law. Therefore, this model takes into account the effects of antenna beamwidth but does not take into account the dependence of scattered power on scattering angle. Nor does it take into account the

effect of horizontal layers in the common volume. Nevertheless, with an appropriate definition of the common volume, the model does agree with other theoretical models as well as with the results of experiments.

According to their models, the envelope correlation coefficient between two frequencies separated by f in Hz is:

$$\rho_e (f) = e^{-(2\pi\sigma f)^2} . \tag{1}$$

The critical parameter in equation (1) is σ, which depends on the maximum difference in propagation delay from the various parts of the effective common volume. The effective common volume has been shown experimentally to depend mainly on path length and scattering angle. But because of refraction of the antenna beams by the earth's atmosphere, simple straight line geometrical reasoning will usually not produce very accurate results.

A model has been developed for the common volume that will take this refraction into account. A simplified version of this model uses an effective earth radius R_e, which is defined and derived in another section of this report. In Rice's model the multipath spread is given by

$$\sigma = \frac{2\ell}{c} \sin \frac{\theta}{2} \tag{2}$$

where ℓ = radius of the common volume/ $\sqrt{3}$

$\theta = \frac{d}{R_e}$ = scattering angle

c = velocity of light in vacuum

d = distance between transmitter and receiver.

Since $\theta \ll \frac{\pi}{4}$, equation (2) can be simplified as

$$\sigma = \frac{\ell\theta}{c} . \tag{3}$$

From Figure 1 it can be seen that the radius of the effective common volume is approximately $\alpha d/4$, where α is the effective beamwidth of the antennas. Thus,

$$\ell = \frac{d\alpha}{4\sqrt{3}} \tag{4}$$

and

$$\sigma = \frac{d\,\alpha\theta}{4\,c\,\sqrt{3}} \tag{5}$$

Because of the scattering mechanism the effective antenna beamwidth α often is only weakly related to the free space beamwidth of the antennas in use. For multipath purposes, a workable expression for the effective antenna beamwidth given by Gordon[9] is:

$$\alpha = \frac{\theta}{2} \quad . \tag{6}$$

This relation is only an approximation and will be modified later in this section. However, when this value is substituted for α in equation (5) we obtain:

$$\sigma = \frac{d\ \theta^2}{8\ c\sqrt{3}} \quad . \tag{7}$$

The Rice Gaussian model will now be compared with one developed by Sunde[4]. Sunde also assumed independent scattering from a large number of scatterers within the common volume. By use of a Fourier series type of argument, Sunde obtained:

$$\rho_e(f) = \left(\frac{\sin\ 2\pi f\Delta}{2\pi f\Delta}\right)^2 \tag{8}$$

where Δ is the maximum departure from the average transmission delay.

A general expression can be derived for the maximum differential transmission delay, based on geometrical considerations. This equation is valid even when the transmitting and receiving antennas have different beamwidths. The notation used is shown in Figure 2.

If δ = total differential path length

S_{min} = minimum path length

S_{max} = maximum path length

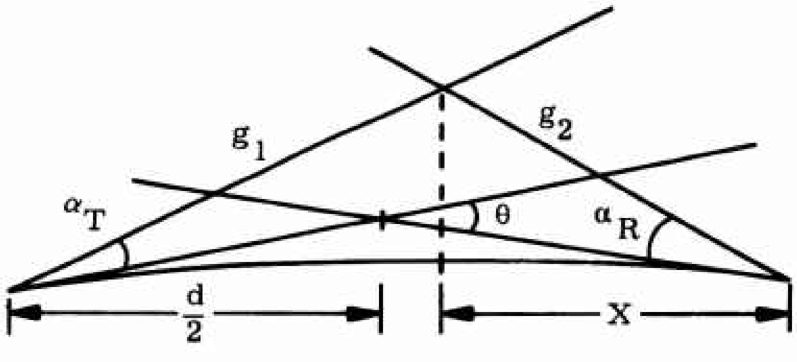


Figure 2. Troposcatter Path With Unequal Antennas

then it is easily shown (Ref. 6) that

$$S_{min} = \frac{d}{\cos \frac{\theta}{2}} \approx d(1 + \frac{\theta^2}{8}), \ \theta \ll 1, \tag{9}$$

and

$$S_{max} \approx d(1 - 1/2 \ (\frac{\theta}{2} + \alpha_R) \ (\frac{\theta}{2} + \alpha_T)), \tag{10}$$

so that the differential path length is

$$\delta = \left| S_{max} - S_{min} \right| = \frac{d}{2} \left[(\frac{\theta}{2} + \alpha_R)(\frac{\theta}{2} + \alpha_T) - \frac{\theta^2}{4} \right]. \tag{11}$$

Equation 11 gives the maximum difference in path length even when the antennas used at each end of the path have different beamwidths.

The time dispersion relative to the average time delay for the case of transmitting and receiving antennas of unequal beamwidths is then approximately given by,

$$\Delta = \frac{\delta}{2\ c} = \frac{d\ \theta^2}{16c} \left[(1 + 2\frac{\alpha T}{\theta}) \ (1 + 2\frac{\alpha R}{\theta}) - 1 \right], \tag{12}$$

and for the case where $\alpha_T = \alpha_R = \frac{\theta}{2}$,

$$\Delta = \frac{3\ d\ \theta^2}{16c} . \tag{13}$$

If it is somewhat arbitrarily assumed that $\sigma = 0.573\Delta$, then Rice's expression for the correlation function becomes

$$\rho_e(f) = \exp[-(2\pi \cdot 0.573\ f\Delta)^2] \tag{14}$$

and under this assumption, the Rice and Sunde (Equation 8) models are in excellent agreement as shown in Figure 3. The two curves are almost identical over the region of most interest, $\rho_e \geq 0.4$. To see how well the two theories agree, the values obtained for Δ and σ must be compared. From equations 7 and 13, it is noted that:

$$\frac{\Delta}{\sigma} = \frac{\frac{3\ d\ \theta^2}{16\ c}}{\frac{d\ \theta^2}{8c\sqrt{3}}} = \frac{3}{2}\sqrt{3} = 2.58$$

while under the assumption that $\sigma = 0.573\Delta$, the result obtained is:

$$\frac{\Delta}{\sigma} = \frac{1}{0.573} = 1.75 \ .$$

Thus, although the two mathematical models were obtained by quite different methods, it is significant that they are in reasonably good quantitative agreement. A more detailed comparison of the S. O. Rice and E. D. Sunde developments for the envelope frequency correlation function was presented in the first interim report[6].

A third method for predicting the frequency correlation function for a troposcatter link is to assume that simple geometric ray tracing is correct and actually integrate over the common volume formed by the intersection of the transmitting and receiving antenna beams. This has been done among others by Bello[5]. These results are compared (for a 200 mile troposcatter link operating at a carrier frequency of 850 MHz and using 28 foot antennas) with the predictions of the Rice model in Figure 4. The general shape of the curve obtained by integrating the scattered power over the common volume is very similar to the one obtained by Rice, but it is apparent that the scale factor is different. The Bello model is discussed in more detail in Appendix A as it pertains to the paths used in this program.

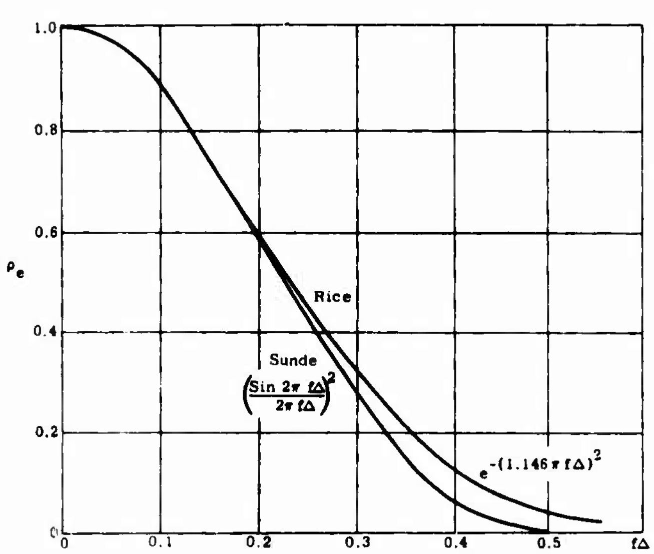


Figure 3. Comparison Between Rice's and Sunde's Model for the Envelope Frequency Correlation Function

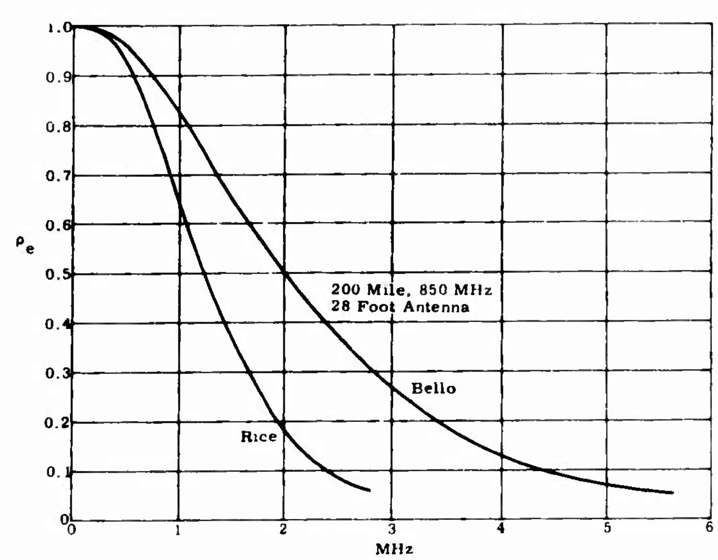


Figure 4. Comparison Between Bello's and Rice's Model for the Envelope Frequency Correlation Function

In conclusion, it is to be noted that all three methods yield very similarly shaped functions. The main difference lies in the scale factor for the frequency axis. This scale factor is inversely related to the effective multipath spread. This topic will subsequently be explored in more detail to obtain a reliable estimate of the multipath spread as a function of path parameters, terrain, and weather.

C. REFRACTIVE INDEX OF THE ATMOSPHERE

The density of the atmosphere and its radio refractive index normally decrease with increasing height. A generally accepted mathematical model for the average radio refractive index as a function of height is:

$$N = N_s \, e^{-ah}$$

where N_s = surface refractive index

a = scale height of the troposphere

h = height above ground.

The agreement of this model with various sets of experimental data has been investigated.

One set of experimental data consists of radiosonde measurements performed in San Juan, Puerto Rico[10] in December 1965. Measurements made at 7:00 a.m. EST on 7 December 1965 (Figure 5) represent typical morning conditions, and measurements made at 7:00 p.m. EST on 9 December 1965 (Figure 6) represent typical evening conditions. By matching the slope of the experimental curve at h = 1 km, it can be seen that

$$N = 377 \, e^{-0.18h} \tag{16}$$

gives a good fit to the experimental data over the primary range of interest.

The corresponding effective earth radius can be found from the equation[11] (also see Section II-E)

$$R_e = \frac{R_o}{1 - \left| \frac{\Delta N}{\Delta h} \right| 10^{-6} \, R_o} \tag{17}$$

where R_o is the actual earth radius (6371 km). For N given by equation 16, R_e = 9902 km.

The gradient in the radio refractive index near the earth's surface can also be found from the formula given by ESSA[12] based on the empirical data:

$$\left| \frac{\Delta N}{\Delta h} \right| = 7.32 \, e^{0.005577 N_s} \quad . \tag{18}$$

For $N_s = 377$, the following is obtained:

$$\left|\frac{\Delta N}{\Delta h}\right| = 59.9/\text{km}.$$

When the corresponding quantity is evaluated directly from the data presented in Figure 5, the following is obtained:

$$\left|\frac{\Delta N}{\Delta h}\right| = 56/\text{km}.$$

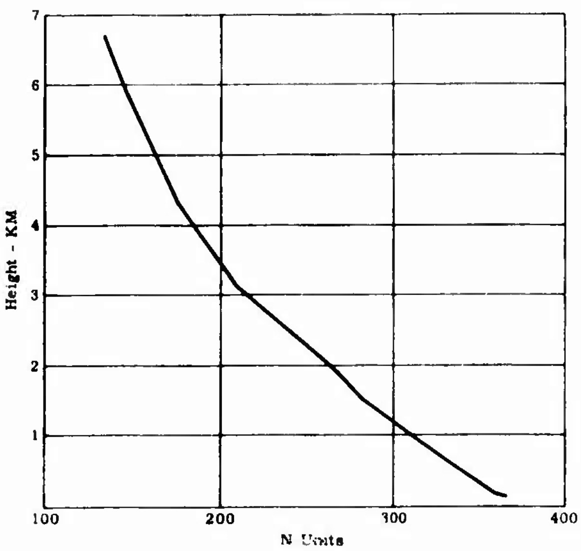


Figure 5. Rawinsonde Profile, San Juan, 7 December 1965, 1200Z

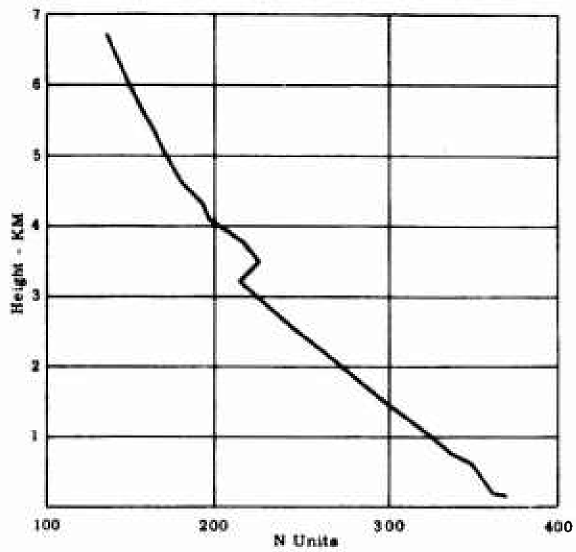


Figure 6. Rawinsonde Profile, San Juan, 9 December 1965, 0000Z

The agreement between the experimental data and the results based on equation 18 is very good.

For the typical evening situation shown in Figure 6, the gradient and the value of the radio refractive index at 1 km can be matched to obtain:

$$N = 372\ e^{-0.15\ h}. \tag{19}$$

This leads to an effective earth radius of 9176 km.

An example on a different type of evening data is shown by using the data obtained from 7:00 p.m. EST on 13 December 1965 (Figure 7). The detailed profile is quite different from the data obtained at the same time of day on 9 December 1965. Nevertheless, a good fit is obtained for:

$$N = 362\ e^{-0.155\ h}. \tag{20}$$

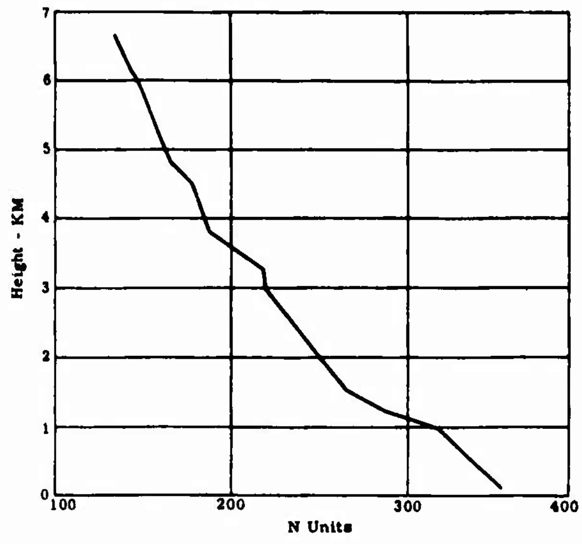


Figure 7. Rawinsonde Profile, San Juan, 13 December 1965, 0000Z

The corresponding effective earth radius is approximately the same as the one obtained from the 9 December 1965 data.

According to typical graphs, the effective earth radius is about 8 percent greater in the morning than in the evening for this over water path in December. Much more extreme cases can be found, as well as cases where R_e is smaller in the morning than in the evening. The results presented do, however, appear to be typical.

In the remaining part of this section it will be assumed that equation 18 adequately represents the gradient of the refractive index.

D. RAY TRACING IN THE ATMOSPHERE

The transmitted signal is radiated from a narrow beam antenna in a direction more or less tangential to the earth's surface. The density of the atmosphere, and therefore its radio refractive index, decreases with height. This decrease in radio refractive index will cause the transmitted beam to be bent toward the earth's surface, rather than to travel in a straight line. This bending will cause a change in the size and location of the common volume of the intersection between the transmitter and receiver beams. It is the purpose of this section to evaluate the actual ray paths as a function of antenna elevation angle and surface refractive index for a commonly used model of tropospheric density variations.

The geometry of the situation is shown in Figure 8. The beam is launched from T at an angle γ_0 with the local tangent to the earth's surface. At the angle β the ray is h meters above the earth's surface. To solve this problem, an equation for ray bending will be set up.

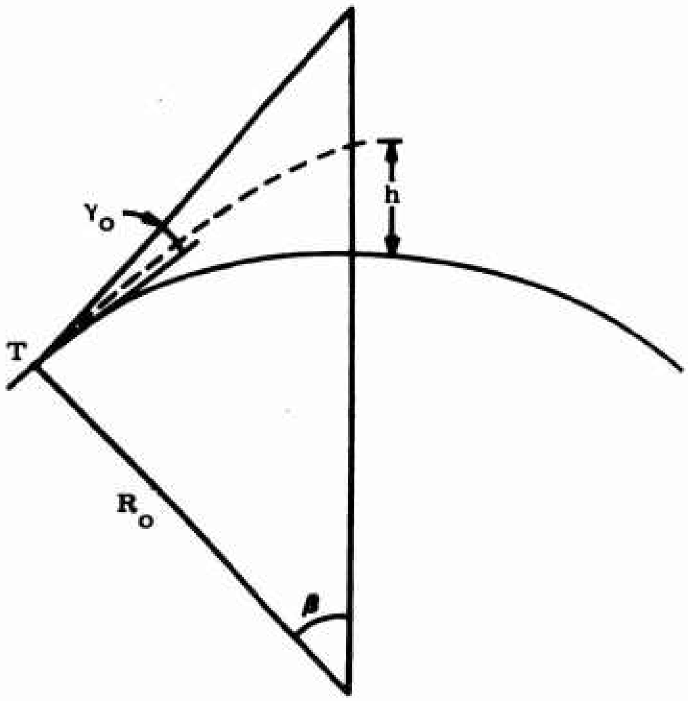


Figure 8. Geometry for Ray Path Calculations

It is assumed that the radio refractive index of the atmosphere decreases exponentially with height:

$$n = 1 + n_o e^{-ar} . \tag{21}$$

The bending of the ray due to passage through an infinitesimal radial distance, dr, is shown in Figure 9. Using Snell's law for a spherically symmetric geometry[13],

$$r\ n \cos \gamma = \text{constant along ray} \equiv k. \tag{22}$$

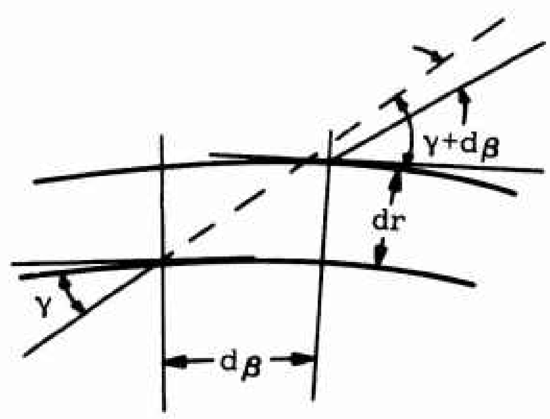


Figure 9. Differential Refraction Geometry

Furthermore,

$$dr \approx \gamma \, r \, d\beta \tag{23}$$

may be derived from the geometry. By use of equations (21), (22), and (23), it follows that

$$\frac{d\gamma}{d\beta} = \frac{d\gamma}{dn}\,\frac{dn}{dr}\,\frac{dr}{d\beta}$$

$$\frac{d\gamma}{d\beta} = 1 - ran_o\, e^{-ar} \,. \tag{24}$$

This equation is valid for $\gamma < 10°$, a condition that is always met in a practical situation.

Since r changes only by, at most, a few km in several thousand, the right hand side of equation (24) is assumed to be constant. We thus obtain the equations:

$$\frac{d\gamma}{d\beta} = K_3 \tag{25}$$

and

$$K_3 = 1 - R_o a n_o e^{-aR_o} \tag{26}$$

where R_o is the earth's radius and $-an_o e^{-aR_o}$ is the rate of change of the radio refractive index near the earth's surface. When equations (23) and (25) are combined, equation (27) for the ray path is obtained:

$$r = R_o \exp\left[\gamma_o\,\beta + 0.5\, K_3\beta^2\right],\ \beta < 5° \tag{27}$$

The distance between the ray and the earth's surface (for a smooth earth) is therefore:

$$h = R_o\left[\exp\left[\gamma_o\beta + 0.5\, K_3\beta^2\right] - 1\right],\ \beta < 5° \tag{28}$$

To use equation (28) values for K_3 must be obtained. From equation (26) it can be seen that:

$$K_3 = 1 - R_o\left|\frac{\Delta N}{\Delta r}\right| 10^{-6} \tag{29}$$

where N is in the conventional N units.

$\Delta N/\Delta r$ can be found by actual measurements of N at various heights. As this is not practical in most cases, use is made of the equation given by ESSA[12].

$$\frac{\Delta N}{\Delta r} = -7.32\, e^{+0.005577 N_s} \tag{30}$$

where N_s is the surface radio refractive index.

The surface refractive index, N_s, changes from hour to hour during the day and also from day to day throughout the year. As the surface refractive index changes so will the ray path and the location and size of the common volume. N_s can be monitored continuously, but in most cases it is more practical to calculate it from the equation[14]:

$$N_s = \frac{K_1}{273 + t}\left(P + \frac{K_2\, H\, P_w}{273 + t}\right) \tag{31}$$

where

$K_1 = 77.6$

$K_2 = 48.1$

t = temperature in °C

P = atmospheric pressure in millibars

H = relative humidity in percent

P_w = saturated water vapor pressure in millibars

The only uncommon quantity in equation (31) is P_w. Tables of P_w are readily available. Over a limited temperature range centered on 15°C, equation (32) gives quite accurate values for P_w:

$$P_w = 13.2 e^{0.0391 t} \text{ millibars.} \tag{32}$$

In the absence of anything but the usual meteorological measurements for the location and time in question, one is able to estimate the actual ray path for a proposed troposcatter circuit. This estimate of the actual ray path will enable one to form a meaningful estimate of the size of the common volume and thus of the correlation bandwidth.

It is assumed that beams are launched at various elevation angles at the transmitting site. The ray path is then computed based on the above theory. The vertical size of the common volume due to an antenna of a given effective beamwidth is the difference in height of the two ray paths at the midpath point.

Tables that can be used to predict the size of the common volume and corresponding multipath spread for large combinations of take-off angles, path length, and surface refractive index have been presented in the first interim report (Ref. 6). Based on these tables, plots of ray path versus beta in degrees are presented in Figures 10 through 13 to illustrate the relative refraction of the rays for different values of surface refractive index, N_s.

This ray tracing technique has been used to computer calculate the multipath spread given the local weather conditions (to find N_s), the path distance, the two take-off angles based on 4/3 earth radius, and the effective beamwidth of the antennas. The concept of effective beamwidth is discussed in subsection H. The computer program is listed in Appendix C.

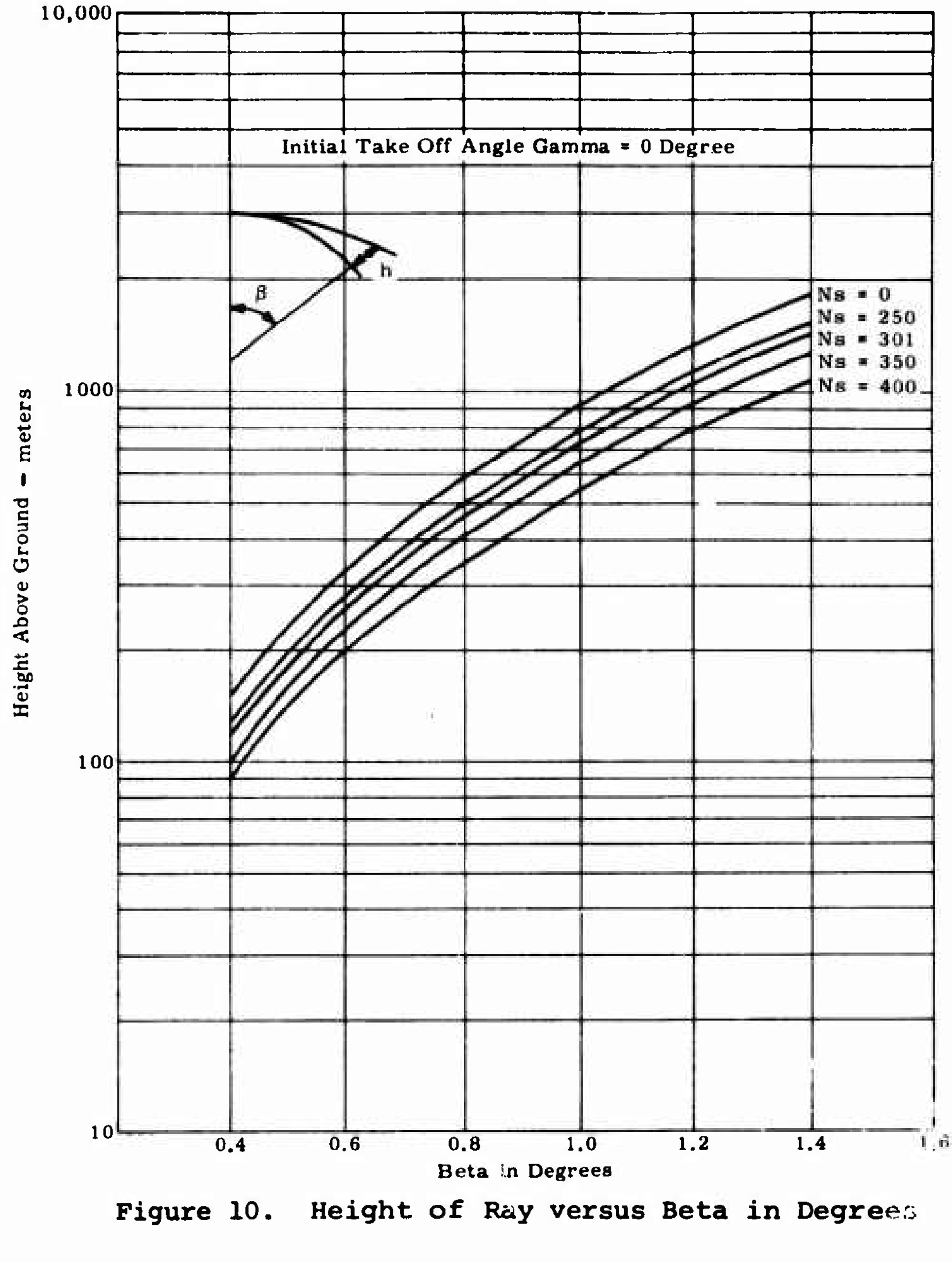


Figure 10. Height of Ray versus Beta in Degrees

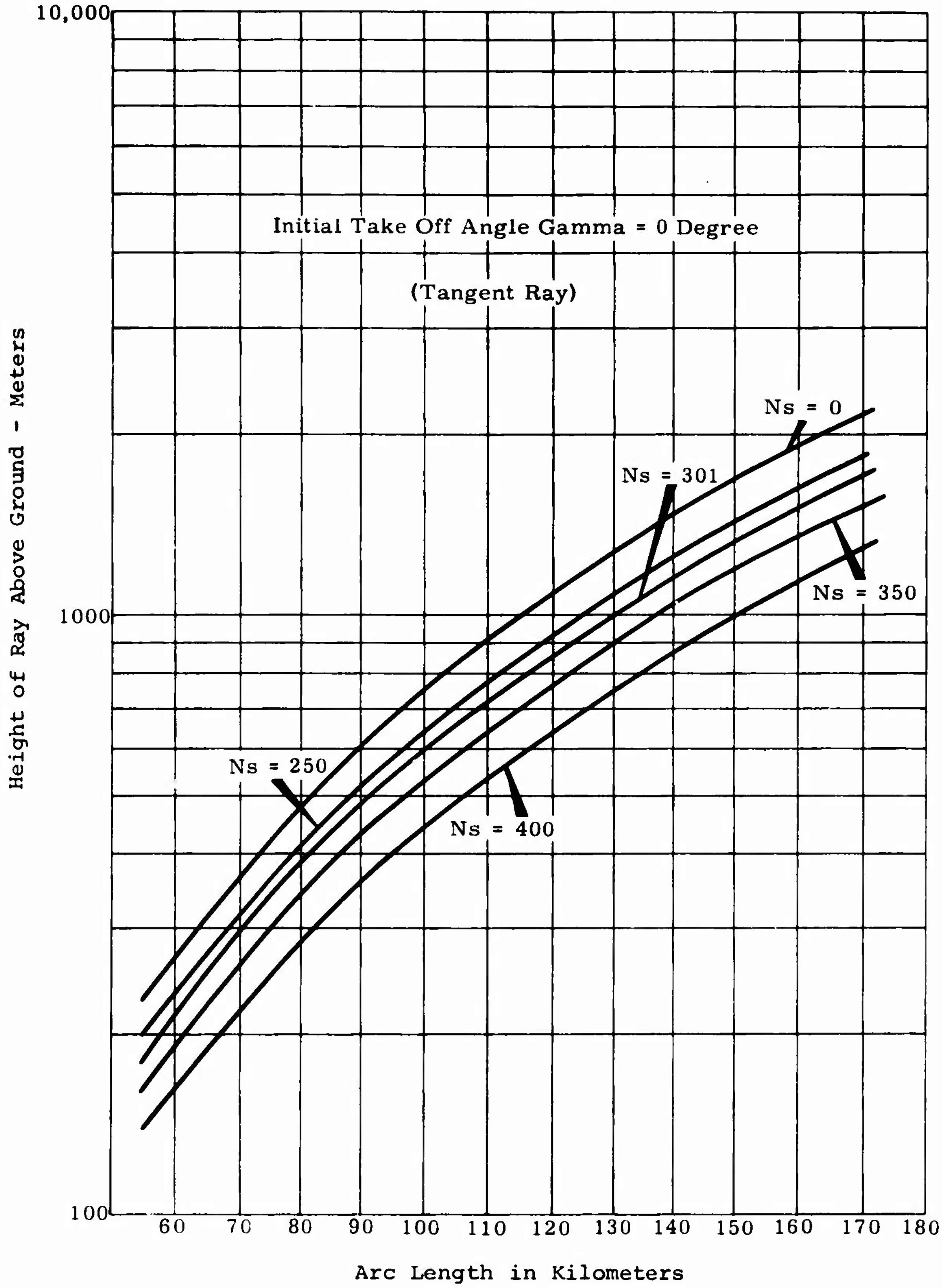


Figure 11. Height of Ray versus Arc Length in km, Initial Take-Off Angle Gamma = 0 Degree

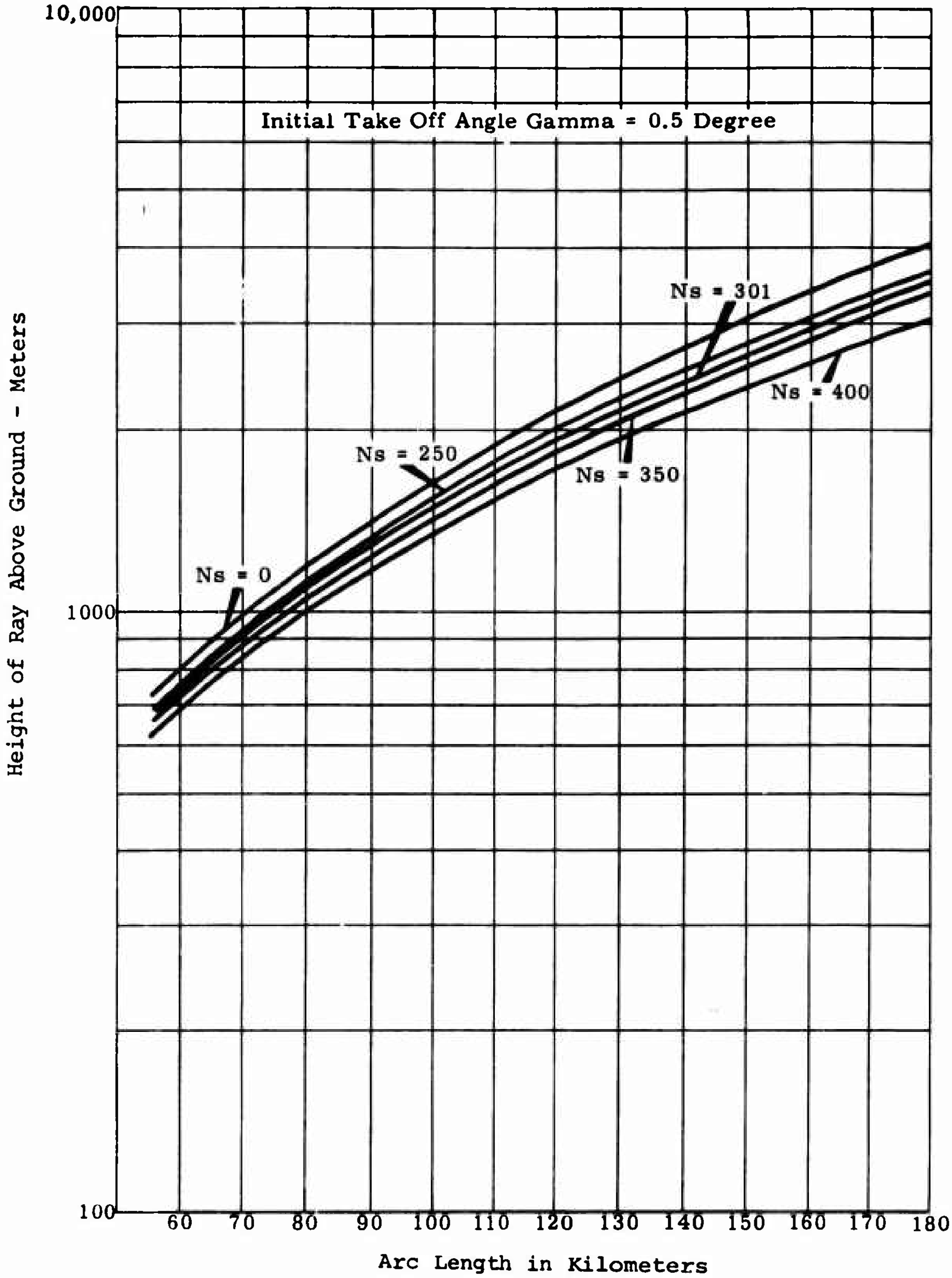


Figure 12. Height of Ray versus Arc Length in km, Initial Take-Off Angle Gamma = 0.5 Degree

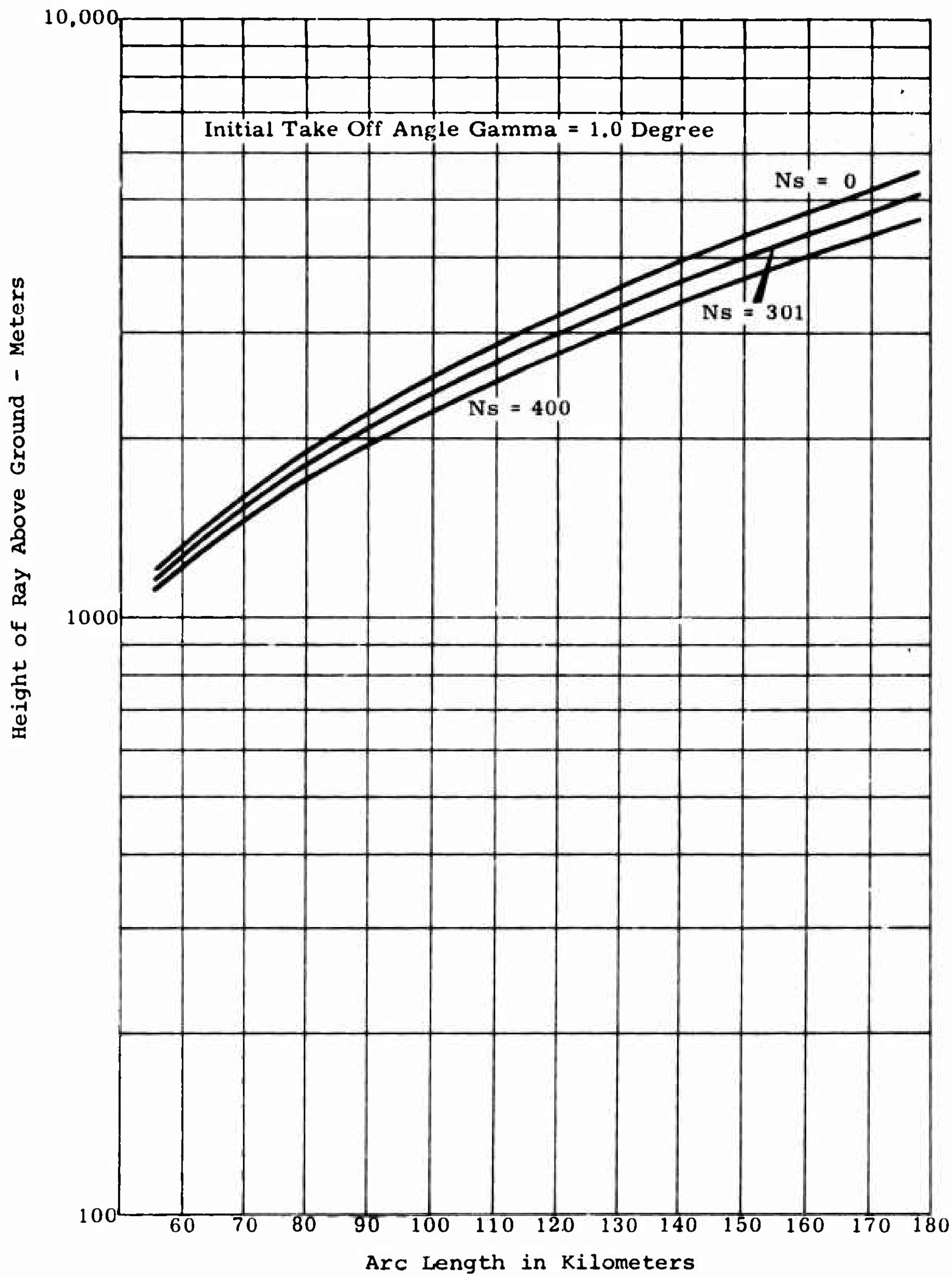


Figure 13. Height of Ray versus Arc Length in km, Initial Take-Off Angle Gamma = 1.0 Degree

E. EFFECTIVE EARTH RADIUS

As shown in the previous section, the transmitter rays are bent toward the earth due to the decrease in radio refractive index with height. Ordinary geometric ray tracing can, therefore, not be directly used to predict the location and size of the common volume.

An approximate method for circumventing this difficulty is to assume that the rays travel in straight lines but that the earth has an effective radius, R_e, greater than the actual one. This effective radius is chosen so that the height of the common volume above ground level, when the rays are assumed straight, is the same as it would be in the actual case. The geometry of the situation is explained in Figure 14. The geometrical angular distance between the midpath point and the transmitter is β. The effective angular distance is ξ. When $\gamma_o = 0$, from equation (28), h becomes

$$h\ (\gamma_o = 0) = R_o\ (e^{0.5K_3 \beta^2} - 1). \qquad (33)$$

This equation for the fictitious earth will now be modified. Since a straight line ray corresponds to $K_3 = 1$, it can be seen that

$$h = R_e\ (e^{0.5\xi^2} - 1). \qquad (34)$$

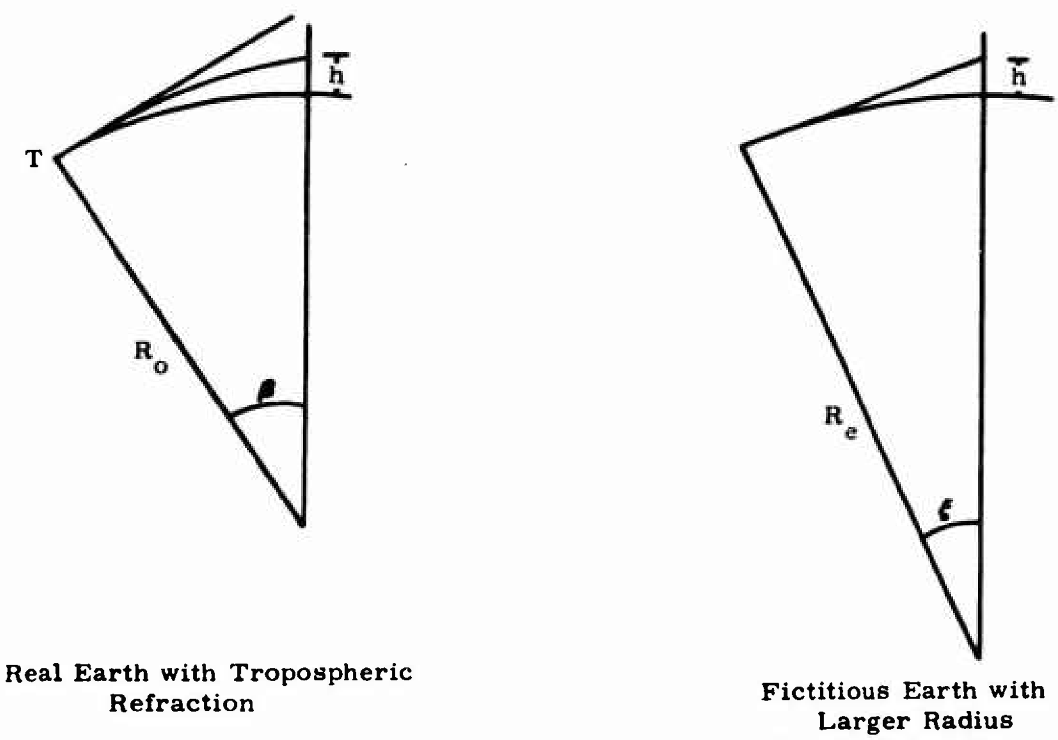


Figure 14. Geometry Showing Relation Between Real and Effective Earth Radius

Since the linear distance between the transmitter and the midpoint of the path is unaffected by atmospheric conditions,

$$R_o \beta = R_e \xi \ . \tag{35}$$

Thus

$$R_o \left(e^{0.5K_3 \beta^2} - 1\right) = R_e \left(e^{0.5\left(\frac{R_o \beta}{R_e}\right)^2} - 1\right). \tag{36}$$

A numerical solution to equation (36) can be obtained by use of a computer. However, since $\beta < 5°$ and K_3 and R_o/R_e are less than one we can approximate the exponential function by the first two terms of its power series expansion. When this is accomplished equation (37) is obtained:

$$R_e = \frac{R_o}{K_3} \ . \tag{37}$$

When K_3 is expressed in terms of its constituents, the final expression for the effective earth radius in terms of the parameters of the atmosphere is obtained:

$$R_e = \frac{R_o}{1 - R_o\left|\frac{\Delta N}{\Delta r}\right| 10^{-6}} \ . \tag{38}$$

F. RAKE MEASUREMENT

One method for studying the structure of the common volume in detail is the RAKE technique. This method is similar to the method used in radar. A signal that can be resolved well in both time and frequency is transmitted. The received signal is resolved. Differences in time shift of various components of the received signal correspond to differences in propagation delay. Differences in frequency correspond to doppler shift suffered by the signal during transmission.

Results obtained in February 1965 on the 484 km path from Fort Bragg, North Carolina to a site located about 20 km Northeast of Washington, D.C.[16] will be studied now. The most important parameters of this path are listed below. It is assumed that the signals travel in straight lines and that the effective earth radius is 4/3 of the actual one obtained as shown in Figure 15. This Figure shows the earth surface, the grazing ray, and the family of confocal ellipsoids corresponding to various time delays relative to the transmission delay of the grazing ray.

Summary of Some Path Parameters

Operating frequency	910 MHz	Shell thickness corresponding to single tap near top of common volume	200 m
Transmitter power	8 kW		
Path length	484 km	Shell thickness corresponding to single tap near bottom of common volume	550 m
Antenna Size	8.5 m		
Beamwidth	3 deg	Differential time delay between top and bottom of common volume	4.6 μs
Height of bottom of scattering volume	3.4 km		
Height of top of scattering volume	16 km	Effective scattering angle (4/3 earth)	3.26 deg

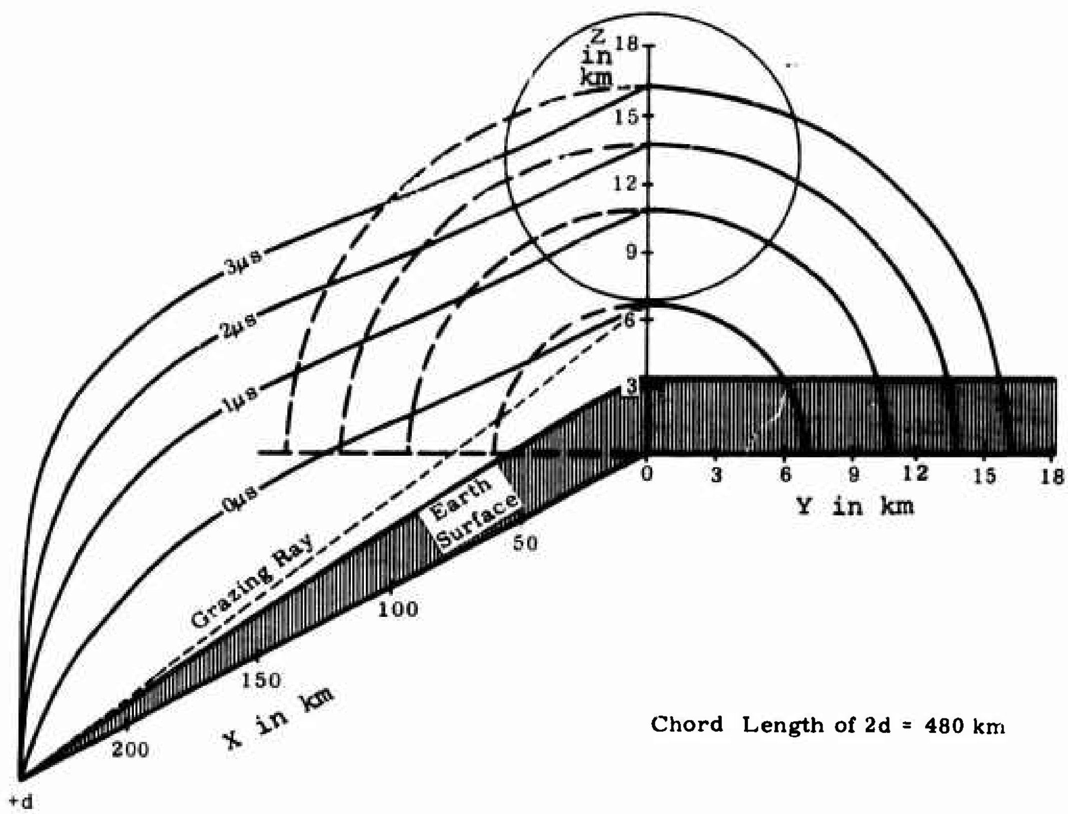


Figure 15. Longitudinal and Transverse Sections of Ellipsoids of Constant Time Delay

The antennas were aligned with beam intersection as shown by the circle in Figure 15. The scattering function displays the spreading of the transmitted signal in time and frequency as shown in Figure 16. The frequency spreading is due to doppler shift due to crosspath wind. This doppler shift affects the fading rate but not the frequency correlation function. Therefore, it will not be pursued further except where it can be used as an aid in locating the effective common volume by a comparison of doppler shifts and crosspath wind data. The time spreading is of primary interest. Since the vertical axis through the antenna pattern in Figure 15 is labeled in relative time delay, a direct mapping from the observed scattering function to the common volume can be performed.

Due to the small number of records available, it is difficult to draw definite conclusions about the nature of the observed scattering functions. However, if this limitation is kept in mind some tentative conclusions may be drawn.

The scattering function shown in Figure 16 was measured at 11:57 a.m. on 17 February 1965; the one in Figure 17 at 1:37 p.m. on 19 February 1965; and the one in Figure 18 at 5:26 p.m. on 16 February 1965. If one assumes that the prevailing weather conditions were similar on the days of the measurements, the differences in scattering functions must be related to the differences in time of day when the measurements were performed. If these differences are typical, the multipath spread tends to be relatively narrow in the morning and increases during the day.

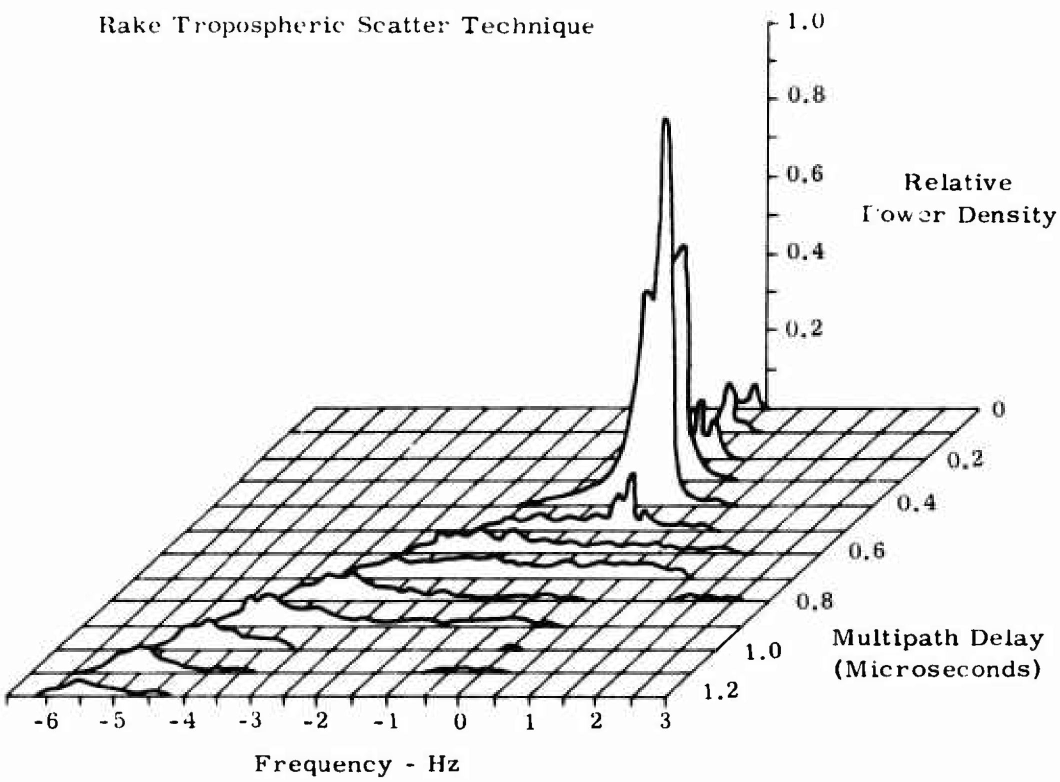


Figure 16. Scattering Function, Record No. 142, 11:57 a.m.,17 February 1965

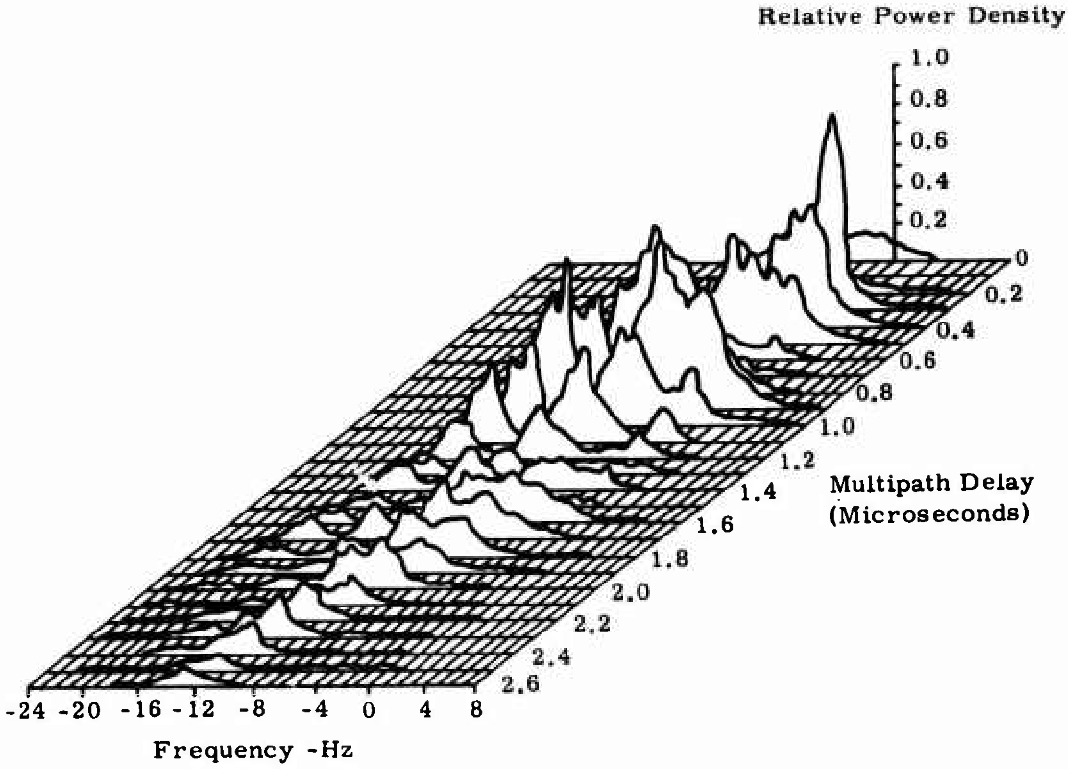


Figure 17. Scattering Function, Record No. 181, 1:37 p.m., 19 February 1965

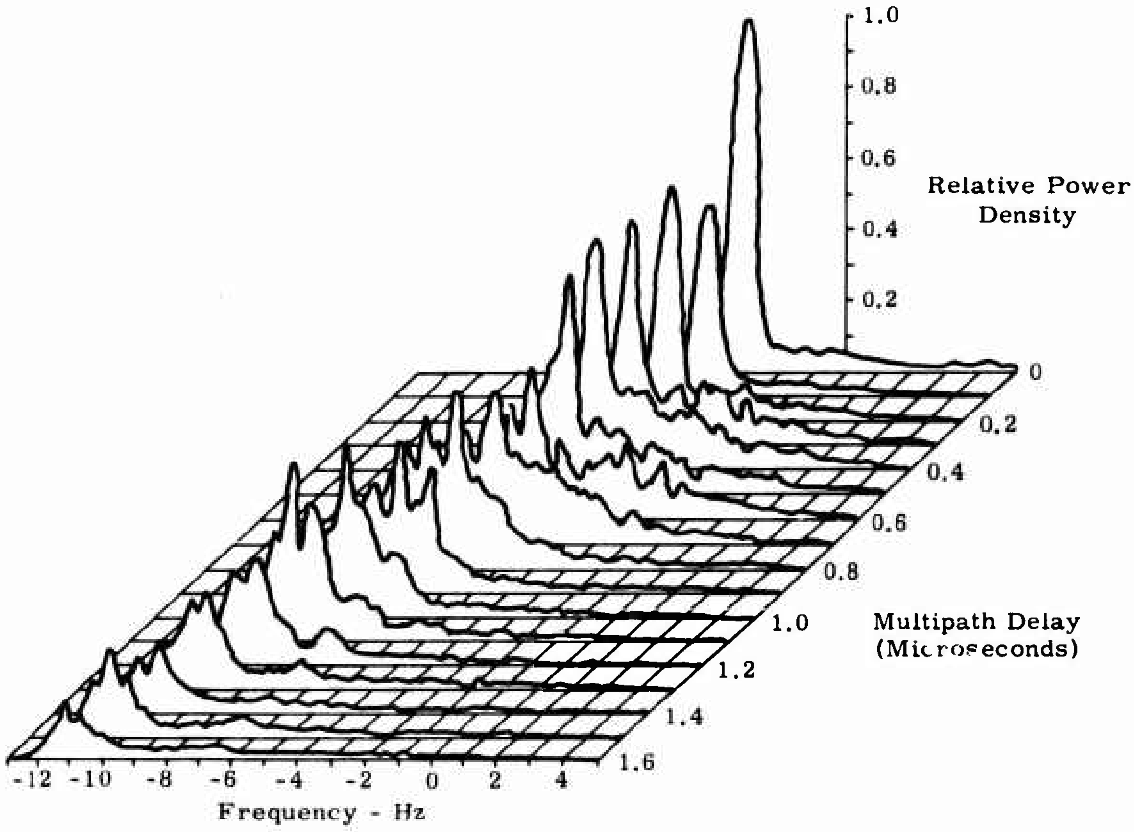


Figure 18. Scattering Function, Record No. 134, 5:26 p.m., 16 February 1965

If it is assumed that the bending of the transmitted and received rays can be accounted for by a 4/3 earth radius throughout the day, the multipath spread on the antenna pattern can be plotted as shown in Figures 19, 20, and 21 for various times of the day. Significantly, it can be seen that at least for this fairly long path, the effective common volume as measured by this RAKE technique is always much smaller then the one predicted by the intersection of the transmitter and receiver antenna beams.

A point still open to question is the height of the effective common volume above ground level. This point can be resolved if there is a relatively strong known crosspath wind at the common volume. Birkemeier[17] reports on measurements made on a 230 km path between Cedar Rapids, Iowa and Arlington, Wisconsin. Birkemeier measured the doppler shift on the Continuous Wave signal as a function of antenna azimuth. At the same time he observed the crosspath wind. During one measurement, the wind was Southeasterly below and Northwesterly above 1600 meters. The 3 dB antenna beamwidth corresponded to a common volume height range from 800 to 3700 meters above ground level, based on a 4/3 earth radius. Birkemeier found that the sign of the average doppler shift corresponded to the direction of the wind below 1600 meters. Thus, the lower 800 meters of the common volume transferred the majority of the transmitted signal power.

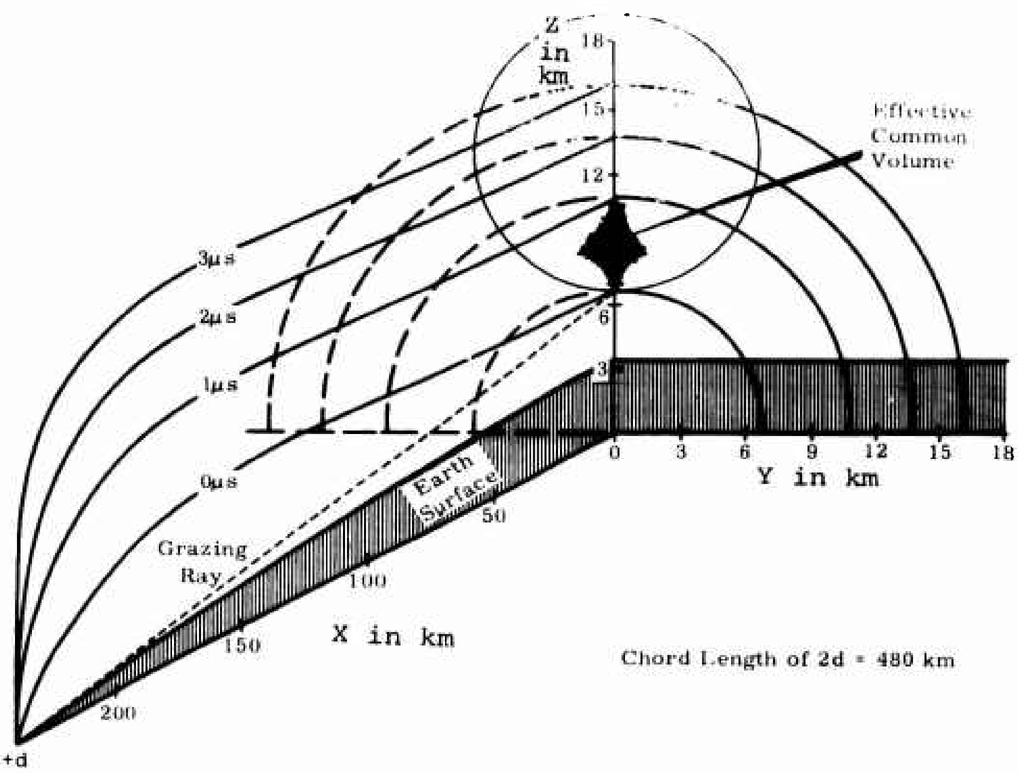


Figure 19. Longitudinal and Transverse Sections of Ellipsoids of Constant Time Delay Showing Effective Common Volume, 11:57 a.m., 17 February 1965

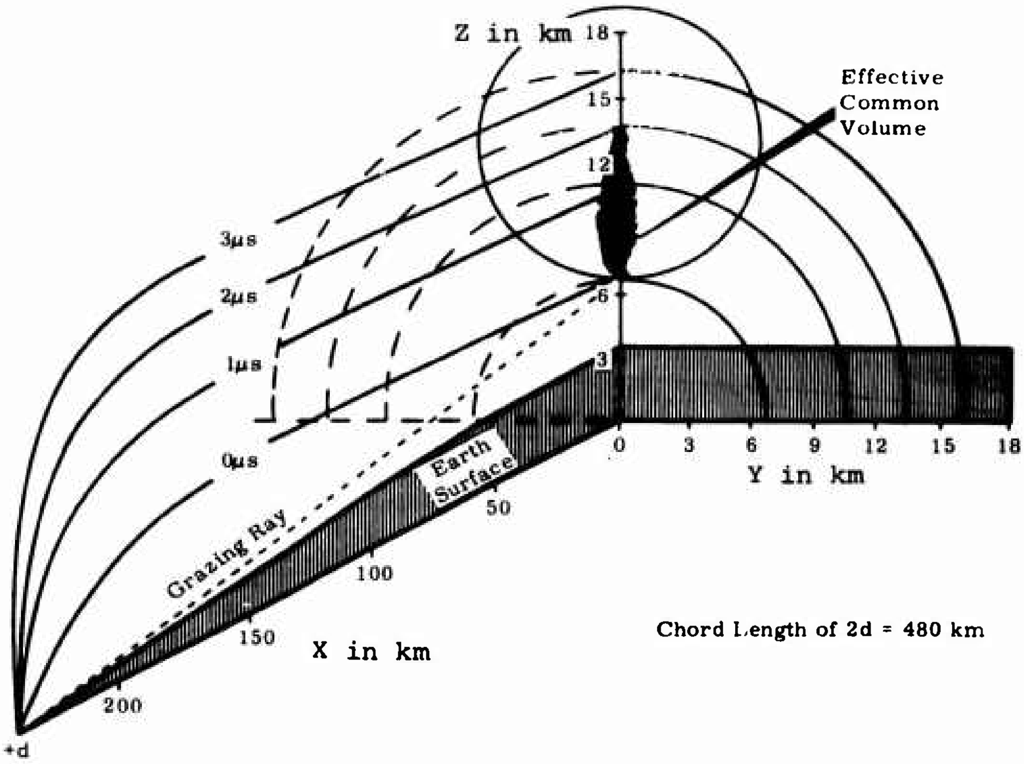


Figure 20. Longitudinal and Transverse Sections of Ellipsoids of Constant Time Delay Showing Effective Common Volume, 1:37 p.m., 19 February 1965

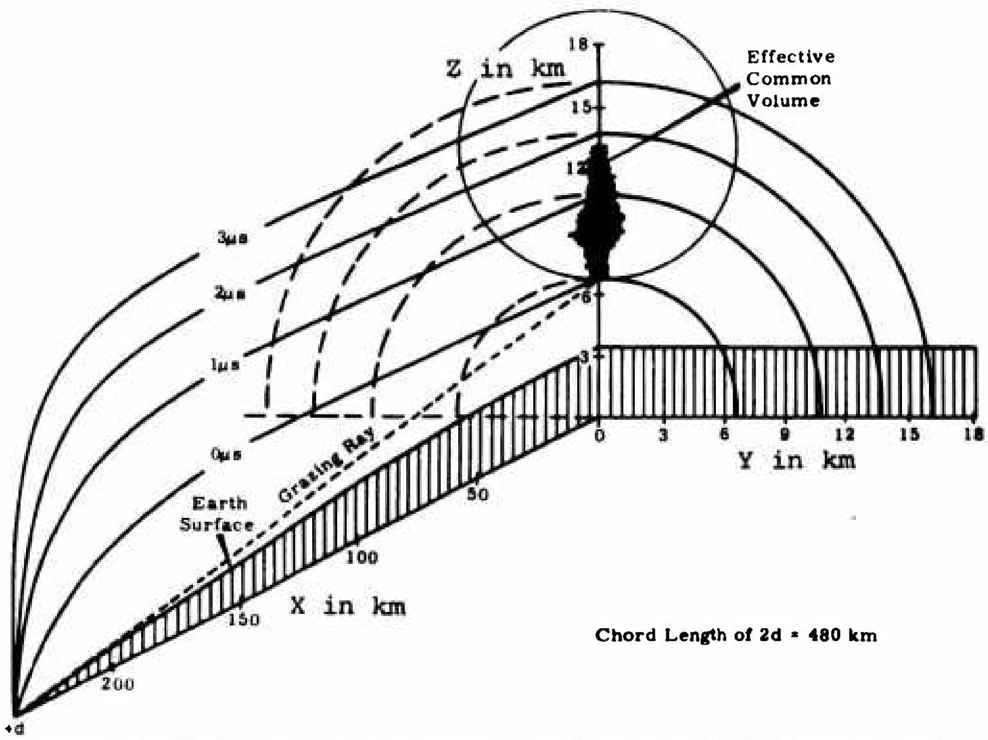


Figure 21. Longitudinal and Transverse Sections of Ellipsoids of Constant Time Delay Showing Effective Common Volume, 5:26 p.m., 16 February 1965

In an experiment on 25 July 1966, the average doppler shift on the received signal corresponded to a crosspath wind of 10 meters per second. Figure 22 shows the measured wind profile versus height for the morning of 25 July 1966. The wind velocity was in the 10 meter per second range from about 1200 to 1500 meters above ground level indicating that this is the location of the effective common volume.

These two detailed investigations tend to reinforce the contention that the scattering angle, rather than antenna beamwidth, usually tends to restrict the size of the common volume. Furthermore, from Figure 21, it is apparent that the effective antenna beamwidth at least for this occasion was only one-half of the actual beamwidth with the majority of forward scatter occurring in the lower portion of the common volume formed by the intersection of the transmit-receive beams.

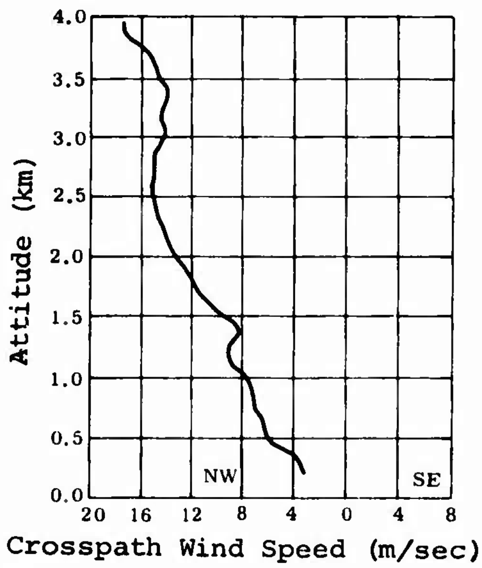


Figure 22. Tropospheric Wind Speed Profile

G. STABILITY OF THE AIR IN THE COMMON VOLUME

The stability of the air within the common volume plays an important part in determining the correlation bandwidth of the troposcatter link. Frequently under unstable conditions the correlation bandwidth has been found to drop by a factor of approximately two. It is, therefore, important to ascertain the meteorological parameters contributing to instability.

The reason for instability of the air in the common volume must be sought in the thermodynamics of the air in the layer from about 500 to 2000 meters above smooth earth level. When a small volume of air is raised it will undergo an adiabatic expansion. Work is required to make the air expand adiabatically.

As the air expands it also cools. If it were an ideal gas, this could go on indefinitely. However, since the air contains water vapor it will eventually reach a point where the temperature equals the dew point of the mixture. Further elevation of the air will cause an adiabatic expansion with condensation, a so called pseudoadiabatic expansion. In this latter phase, energy is released.

If, on balance, energy is released when a small volume of air is raised, the air is in an unstable condition.

Estimation of the potential stability of the air can conveniently be done by use of curves of temperature and dew point as a function of pressure. Such charts are prepared twice daily by a number of weather forecasting stations throughout the world. We will give an example of how such a chart can be used to estimate the potential stability of the air including the common volume.

Let us consider the pressure temperature curve shows in Figure 23. We will estimate the work required to lift a small volume of air from the 950 mb level where it will be at a temperature T_1 to the 850 mb level where it will be at the temperature T_4.

Initially the air will expand adiabatically parallel to the adiabatic direction until it is saturated. This is the point M_2. From M_2 to the 850 mb level the air will expand pseudoadiabatically, i.e., with condensation. The air thus will arrive at the 850 mb level at the point M_3. The

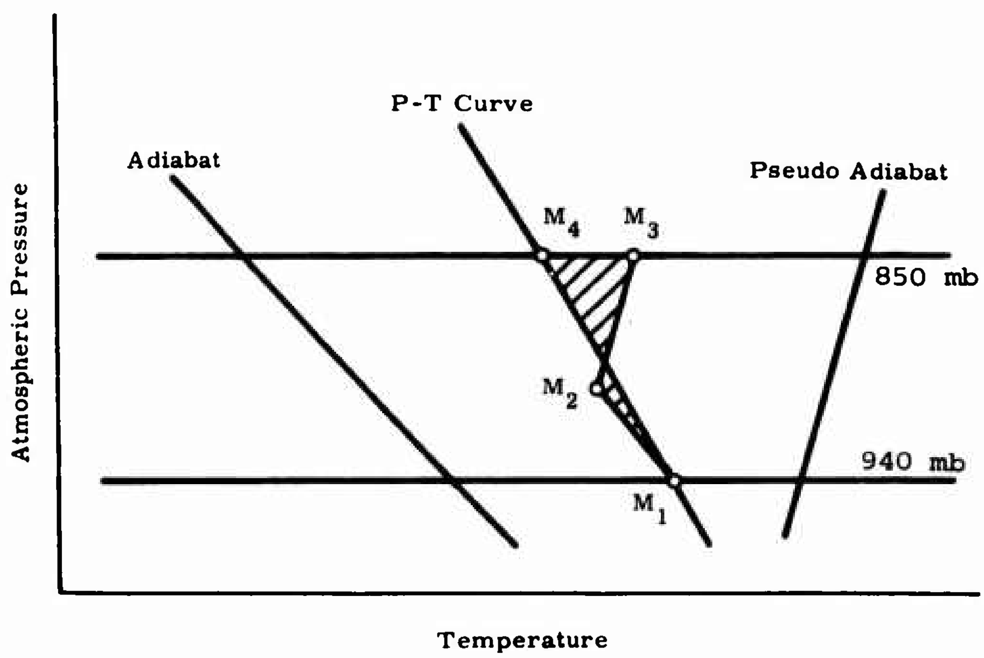


Figure 23. Typical P-T Curve for Atmosphere

area between the P-T curve and the path M_1, M_2, M_3, and M_4, counting area in the right side of the curve as positive, represents the work required to move a small volume of air from the 950 mb level to the 850 mb level.

If this work is positive, the atmosphere is stable, if it is negative the atmosphere is unstable.

This method allows estimation of the stability of the air in the common volume when sonde data is available. If one postulates a suitable thermodynamic model for the atmosphere, it is possible to obtain a reasonable estimate of the P-T curve from a sequence of ground based temperature measurements even in the absence of sonde data.

In the following we will assume that there is no inversion layer between the ground and the common volume. In the summer the air above the ground will heat during the day due to conduction and radiation from the earth. This warm air will gradually rise and supply the atmosphere with warmer, and frequently more moist air. If we assume that the P-T curve was vertical in the morning it will acquire a decreasing negative slope throughout the day. The slope will be least at the time of day when the ground level temperature is highest. This situation is shown in Figure 24.

We see from Figure 24 that if the P-T curve is as assumed, an unstable condition exists in the common volume.

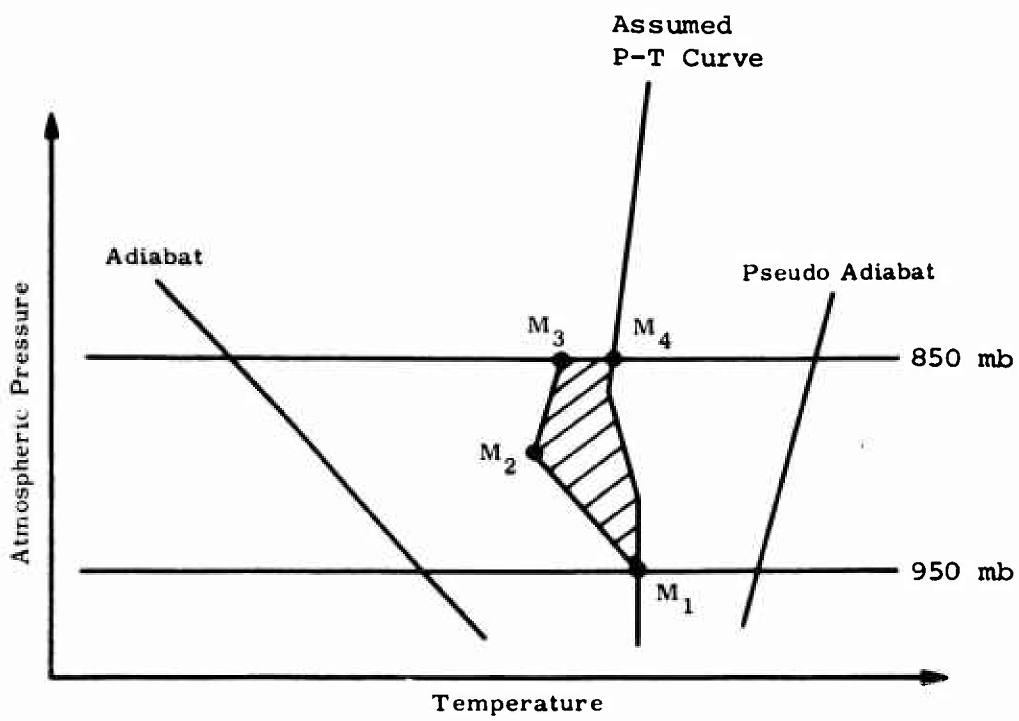


Figure 24. P-T Curve Showing Atmospheric Instability

From this we can conclude that under normal circumstances the greatest chance for turbulence occurs at about the time when the ground level temperature reaches it maximum value.

Since the degree of turbulence has a direct effect on multipath spread, a scale factor can be associated with the stability of the troposphere in and near the common volume. This scale factor will vary from unity in the case of complete turbulence to as small as 0.4 in the case of normal stratification. Under unusual propagation conditions, such as are sometimes found over water, the scale factor can attain even smaller values.

The probability distribution of the stability of the troposphere is therefore directly related to the probability distribution of the multipath speed and in turn directly relatable to the correlation bandwidth of the troposcatter channel.

H. DEVELOPMENT OF THE CORRELATION BANDWIDTH MODEL

Within the framework of the foregoing discussion, an empirical model has been developed which successfully predicts the envelope frequency correlation function for the series of field tests that were made during this program. It is believed that this model has wider applicability in that:

1 There is a plausible theoretical hypothesis to support it, and

2 Application to paths not measured here has yielded good agreement.

The approach taken has been to obtain a model for the lower decile of the measured correlation functions, that is, those with maximum multipath spread. A study of the correlation function plots in a following section has revealed that to a good approximation, the upper decile of measured correlation functions corresponds to those of the lower decile with a frequency scale factor of 2.5. Therefore, emphasis has been placed on the prediction of the lower deciles. It is not crucial to this model but it has been argued that the lower deciles correspond to those occasions when turbulent scattering has been predominant, the upper deciles occurring during conditions of stratification. The preceding subsection has detailed how a prediction of stability or turbulence in the common volume is possible with the general conclusion that more turbulence is to be expected when the surface temperatures are maximal as would normally occur during the afternoon. Verification of this hypothesis has been made for a limited number of individually measured tests.

The correlation function has been modeled as Gaussian. As just discussed, any of the several earlier models indicate that this is a valid approximation if a suitable scale factor (or equivalently variance) is found. Moreover, the results of the tests included here point up that in actuality, the correlation function is nearly Gaussian in the region of interest, $0.4 < \rho_e < 1$.

It was found quite early that the actual half power antenna beamwidth (HPBW) had little bearing on the measured correlation functions. If it had, the X- and C-band tests with differing antenna beamwidths would have exhibited considerably different correlation bandwidths, while in fact the deciles have been found nearly equivalent. This same conclusion with measurements at a single frequency but differing antenna sizes has been demonstrated previously[7].

It appears that in most practical links of path length over 100 miles, the intersection of the transmit and receive beams is considerably different than that part of the atmosphere which efficiently produces forward scatter. Consequently, in the calculation of the multipath spread, it is convenient to introduce the concept of effective beamwidth α_e which is the angular extent of the beam producing effective scattering. Clearly the effective beamwidth should be limited to approximately the HPBW of either antenna α. It is assumed that α is the same for both the transmit and receive antennas as it was for these tests. Since α_e will be the key parameter, this is not a critical assumption. In an earlier reference to a paper by Gordon[9], it was mentioned that the effective beamwidth is often taken to be the smaller of the actual beamwidth or one-half the scatter angle. In fact, in the three earlier interim reports (References 6, 15, and 20) this assumption was made. In order to fit the data, this unfortunately led to a "variable" scale factor in the exponential model for each of the four paths. The model developed here is essentially the same as given in the earlier interim reports but it is assumed more generally that the effective beamwidth is equal to the product $K(\theta) \cdot \theta$ where $K(\theta)$ has been empirically determined. Thus the variation between the four paths will be taken out of the scale factor (S_t) and be placed more naturally in the effective beamwidth.

Toward the development of this model, the envelope correlation function can be represented as

$$\rho_e = \exp\left[-\left(S_t \;\Delta f\right)^2\right] \tag{39}$$

where S_t is a scale factor for turbulent scattering to be determined, Δ is the multipath spread as calculated by the ray trace model for an effective beamwidth α_e, and f is the frequency separation. S_s, the scale factor for a stable common volume, will be $S_t/2.5$ or $0.4\ S_t$.

For a given multipath spread, geometrical considerations imply that the effective beamwidth must increase for shorter paths. Since the observed multipath spreads were not markedly different over the four paths, it follows that the effective beamwidth must be greatest for the shortest of the paths, that is, Model City - Ontario Center. To insure that the effective beamwidth α_e was never greater than the actual value of α , the value of α_e for this path was set equal to the smallest actual value of α, the X-band figure of 1.07 degrees. It is realized that this assumption is somewhat arbitrary since even for this short path (85 miles) there is no firm assurance that the entire beamwidth produces scatter. It is, however, a reasonable working hypothesis and should be non-crucial for any longer paths (or more precisely, larger scatter angles).

With the assumed value of α_e for the Ontario Center link it is possible to find the multipath spread. A value of N_s must be adopted and in the following, unless otherwise stated, $N_s = 301$ has been used exclusively implying the usual 4/3 earth radius approximation. The validity of this approach will be discussed later.

The calculation of the multipath spread Δ was here accomplished using the ray trace program listed in Appendix C. Other than N_s and α_e. Δ depends on the path distance d, the two take-off angles, γ_E and γ_W, and the altitude of the two terminals. These are available from the contour profiles shown in Section III. The notation is shown in Figure 25. The calculated value of Δ for the Ontario Center link is found to be 0.157 microseconds. To agree with the X-band, Ontario Center, summer lower decile correlation bandwidth of 1.5 MHz (at $\rho_e = 0.4$), S_t must then be equal to 4.06.

$$S_t = 4.06 \tag{40}$$

and therefore

$$S_s = 1.62 \; . \tag{41}$$

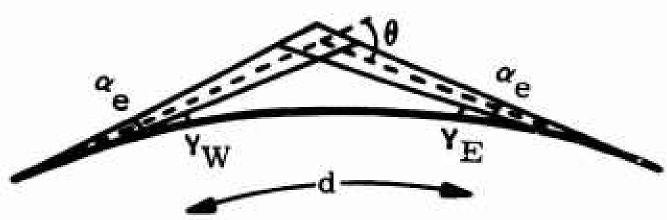


Figure 25. Geometry for Empirical Troposcatter Model

It is of interest that this value of S_t is not radically different from Rice's factor of 2π. Additionally, one series of simulator measurements, in which Δ was programmed in with the correlation bandwidth being measured, indicated an S_t of about 2.5 (Reference 21, p 258).

If S_t is assumed fixed for the three remaining paths, it is possible to find the multipath spread necessary to match the measured lower decile correlation bandwidths. These multipath spreads, in turn, through the ray trace program, imply an effective beamwidth necessary to produce them.

Thus for the desired value of S_t a determination of the value of effective beamwidth can be made for each. These values are plotted versus the scatter angle,

$$\theta = \gamma_E + \gamma_W + \frac{d}{R_e} \tag{42}$$

in Figure 26. These scatter angles are based on $N_s = 301$ $(R_e = \frac{4}{3} R_o)$.

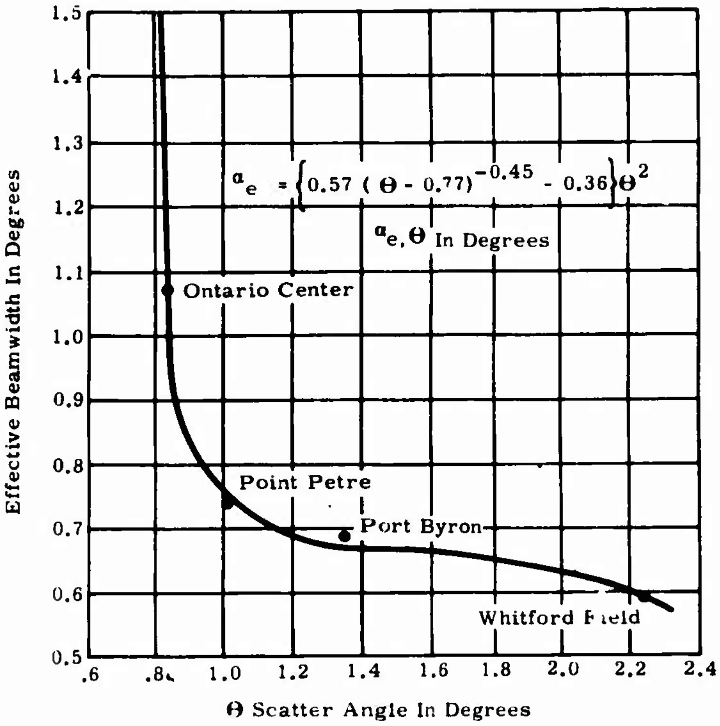


Figure 26. Empirical Effective Beamwidth for Application in Ray Tracing Computer Program

The analytic function

$$\alpha_e = \left\{0.57(\theta - 0.77)^{-0.45} - 0.36\right\}\theta^2 \quad (\alpha_e,\ \theta \text{ in degrees}) \tag{43}$$

gives a reasonable fit to the experimental points. Equivalent to this figure, Figure 27 gives $K(\theta)$ as a function of the scatter angle θ, where $K(\theta)\cdot\theta$ is the effective beamwidth. That is,

$$K(\theta) = 0.57\,\theta\,(\theta - 0.77)^{-0.45} - 0.36\,\theta \tag{44}$$

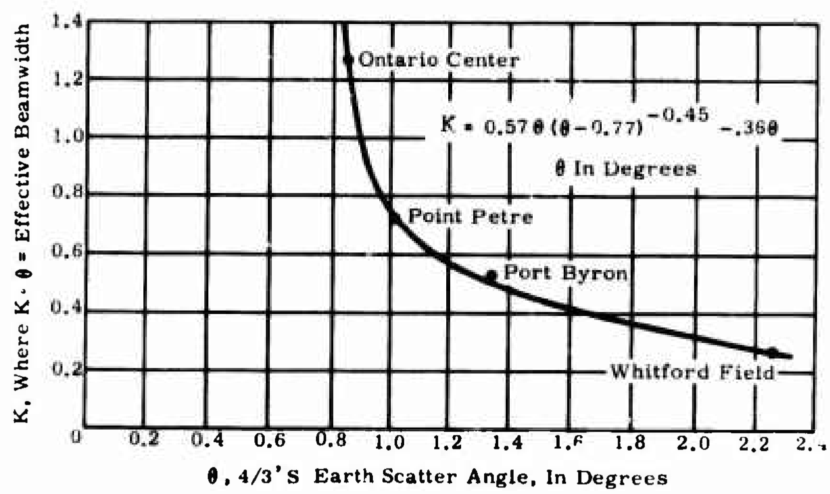


Figure 27. K as a Function of Scatter Angle, where K is the Quotient of the Effective Beamwidth and the Scatter Angle

These figures illustrate that in general, if the scale factor S_t is assumed constant, α_e is not equal to one-half the scatter angle; that is, $K \neq 0.5$ in general. It is also apparent that α_e may become larger than α, the actual half-power beamwidth. In practice, α_e must be limited to α.

The scatter angle θ is felt to be the single most important parameter in characterizing a link since it depends on both the path distance and the take-off angles (as given by equation 42). It is likely that the effective beamwidth, and ultimately the correlation bandwidth, depends independently on the path distance and take-off angles in a way that is more complicated than summarized in the single parameter, scatter angle. This could be an area of further research. Nevertheless, lacking further data, there is little question that a fairly accurate model of a path can be made from the single concept of an effective beamwidth which is a function only of the scatter angle.

The calculation of the scatter angle has been predicated on the assumption of $N_s = 301$ since this provides a base for future predictions. This implies that the scatter angle is to be considered a fixed parameter for a specific link. In actuality this condition will rarely be realized; for the links tested here N_s varied from approximately 301 to 370. Nevertheless, for predicting the correlation bandwidth for other links, the scatter angle based on 4/3 earth radius ($N_s = 301$) should also be used.

Thus, even though it is very convenient to characterize a link by a fixed scatter angle it must be kept in mind that the actual value of θ is dependent on a time varying R_e (and to a lesser degree of importance on time varying γ_E, γ_W). This fact will lead to negligible modifications for the case of longer paths where θ is large but it is to be noted that for short paths (small θ), K is very sensitive to changes in θ. Something approaching this behavior was noted for the Ontario Center path where the short term variations (periods of 1 to 3 hours) were more pronounced than for the other three longer links. Ideally, figures such as Figure 27 could be made for a set of N_s values. Here, the method of computer reduction did not lend itself to this type of analysis and it must be considered an area of future study.

It has become evident, however, that even in the region of Figure 27 where K is sensitive to θ, the observed variations between the upper and lower decile correlation bandwidths is much too great to be accounted for by simple changes in N_s (and therefore θ and α_e). This is felt to be an important point and lends further substance to the argument that between the upper and lower deciles there is a change in the common volume more severe than could be explained by variations in N_s; that is, it supports the theory of turbulent versus layer scattering.

Although N_s is considered constant in the determination of θ, N_s also enters as a parameter in the ray trace procedure. Here it may be allowed to vary and set to any expected value. However, as will be discussed in

the next subsection, changes in N_s in the ray trace program have only a small effect on the correlation bandwidth.

It will be instructive to illustrate the procedure to be used in predicting the correlation bandwidth for a hypothetical link. It is assumed that d, γ_E, γ_W, and N_s (or P, T, %H) are known. The true beamwidth will also be known but it plays no role unless α_e is found to be greater than α in which case α would be used.

First, the scatter angle θ would be calculated by equation 42 in which γ_E, γ_W, and d/R_e are all based on the approximation of 4/3 earth radius. Using Figure 26 or equation 43 the effective beamwidth would be found and adopted unless it were larger than the actual HPBW. The value of N_s would be calculated from the expected values of pressure, temperature, and relative humidity by equation 31. Table I in the next subsection gives typical values of N_s for various combinations of these parameters. At this point, computer techniques for ray tracing greatly facilitate the calculation of the multipath spread though the calculation could be approximated by hand. A listing of the ray trace program based on the derivations in Section II-D is given in Appendix C. Knowing Δ, the model correlation function is given by equat[illegible]9, that is,

$$\rho_e = \exp\left[-(4.06 \ \Delta \ f)^2 \right] \tag{45}$$

This ρ_e is explicitly for the lower decile of expected correlation bandwidths. The upper decile is of the same form, but with S_t replaced by $S_s = 1.62$.

I. EFFECT OF WEATHER ON CORRELATION BANDWIDTH MODEL

The surface index of refraction N_s may be calculated from the temperature, relative humidity, and barometric pressure measured at the receiver or transmitter site by equation 31. Table I displays the values of N_s calculated for various typical values of these parameters. Over the range of weather conditions shown in this table N_s ranges from 304 to 354. During the test period N_s values as high as 370 were calculated from actual weather conditions.

As pointed out previously, variations in N_s produce two changes in the empirical model. The first is the dependence on N_s in the ray trace program. There the rays will follow slightly different paths for varying N_s. Secondly, the scatter angle will also in actuality depend on N_s through a dependence on R_e. This changing scatter angle will affect the effective beamwidth and thus the correlation bandwidth. In the model presented here predictions were based on a 4/3 earth radius scatter angle and this second effect will at this point be considered only in a qualitative manner.

To determine the first of these effects, the correlation bandwidth model was evaluated setting N_s equal to 301 and 370 in the ray trace program for both the shortest path, Model City-Ontario Center, and the

longest path, Model City-Whitford Field. Figures 28 and 29 are plots of the resulting predicted correlation coefficients. It is evident that changes of N_s in the ray trace program have little effect on the correlation bandwidth.

Table I

CHANGES IN INDEX OF REFRACTION, N_s, WITH CHANGES IN TEMPERATURE, RELATIVE HUMIDITY, AND BAROMETRIC PRESSURE

Temperature Degrees F.	Relative Humidity Percent	Barometric Pressure Inches Mercury	N_s
15	60	29.75	326.0
45	60	29.75	328.9
75	60	29.75	348.6
45	30	29.75	303.9
45	60	29.75	328.9
45	90	29.75	353.9
45	60	29.50	326.5
45	60	29.75	328.9
45	60	30.00	331.2

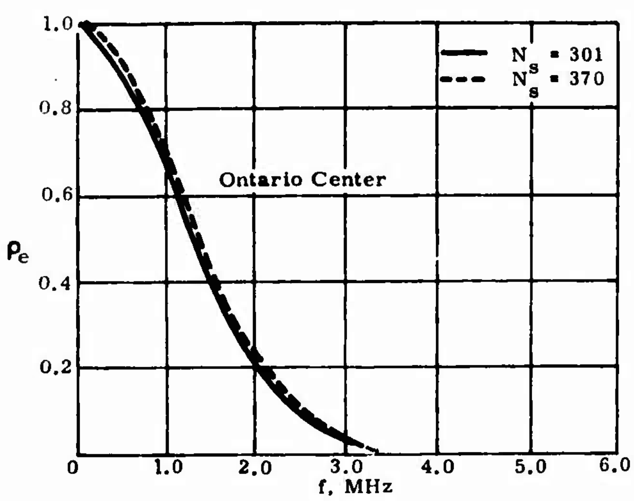


Figure 28. Change in Correlation Function with Change in N_s in Ray Trace Program. Ontario Center Receive Site.

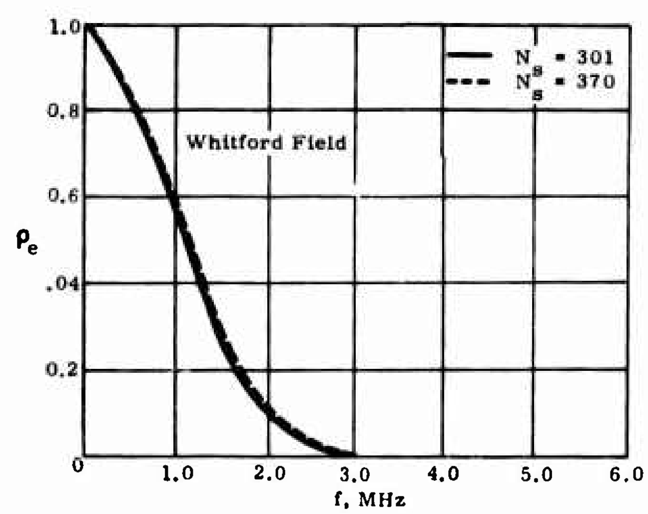


Figure 29. Change in Correlation Function with Change in N_s in Ray Trace Program. Whitford Field Receive Site.

Secondly, as mentioned in Section II-H, the scatter angle θ will in fact be time variant. For θ written as

$$\theta = \gamma_E + \gamma_W + \frac{d}{R_e}$$

it is possible to show the effect of a changing N_s on each of the three components. Table II gives the values of γ_E, γ_W, and d/R_e for the four test paths under conditions of N_s equal to 301, 350, and 370. The take-off angles vary with R_e in the following way:

$$\gamma = \frac{(h_o - h_s)}{d_o} - \frac{d_o}{2R_e} \tag{46}$$

where h_s and h_o are the elevations of the site and obstruction respectively, and d_o is the distance from the site to the obstruction. The values of θ and α_e (both in degrees) for the three conditions are also listed. The variation of θ is seen to be small and will lead to only minor modifications in the effective beamwidth and the predicted correlation bandwidth for three of the paths. For the Ontario Center link α_e will remain 1.07 degrees since smaller values of θ than 0.843 imply $\alpha_e > \alpha$, a condition for which the model requires $\alpha_e = \alpha$. For the Point Petre link the predicted change in α_e will be large but still insufficient to explain the observed variation between the upper and lower deciles. This variation is shown in Figure 30. For the remaining two paths the variation is very much smaller.

Table II

VARIATION IN SCATTER ANGLE WITH N_s

(all angles in degrees)

	$N_s = 301$, $R_e = 8493$ km					$N_s = 350$, $R_e = 9487$ km					$N_s = 370$, $R_e = 10,068$ km				
	γ_E	γ_W	d/R_e	θ	α_e	γ_E	γ_W	d/R_e	θ	α_e	γ_E	γ_W	d/R_e	θ	α_e
Ontario Center	-0.124	0.025	0.943	0.843	1.07	-0.121	0.030	0.844	0.753	1.07	-0.120	0.032	0.796	0.706	1.07
Point Petre	-0.059	-0.034	1.103	1.010	0.735	-0.056	-0.030	0.987	0.901	0.854	-0.055	-0.028	0.931	0.848	1.06
Fort Byron	-0.010	0.049	1.296	1.335	0.680	-0.005	0.052	1.160	1.207	0.682	-0.000	0.053	1.094	1.147	0.687
Whitford Field	0.865	0.049	1.343	2.257	0.602	0.865	0.052	1.204	2.121	0.625	0.865	0.053	1.133	2.051	0.625

NOTE: α_e limited to $\leq \alpha$

Since variations in N_s in the ray trace program have slight effect on the predicted correlation bandwidth and since in the present model the scatter angle is based on a 4/3 earth radius, the scale factor for the condition of the troposphere (equaling 1 for turbulent and 0.4 for layering) is the only factor which causes a change in the predicted correlation band-

width for a given path. A method to determine the condition of the scatter volume from observations on the surface was given in Section II-G but dependable predictions will depend on the availability of sonde data.

From these results it can be concluded that short term (1-3 hours) variations in the correlation bandwidth are to be expected but that they cannot be accurately predicted by weather conditions measured only at the surface. The predictions of the lower and upper deciles can however be made and gives a statistical base for the expected variation in the correlation bandwidth.

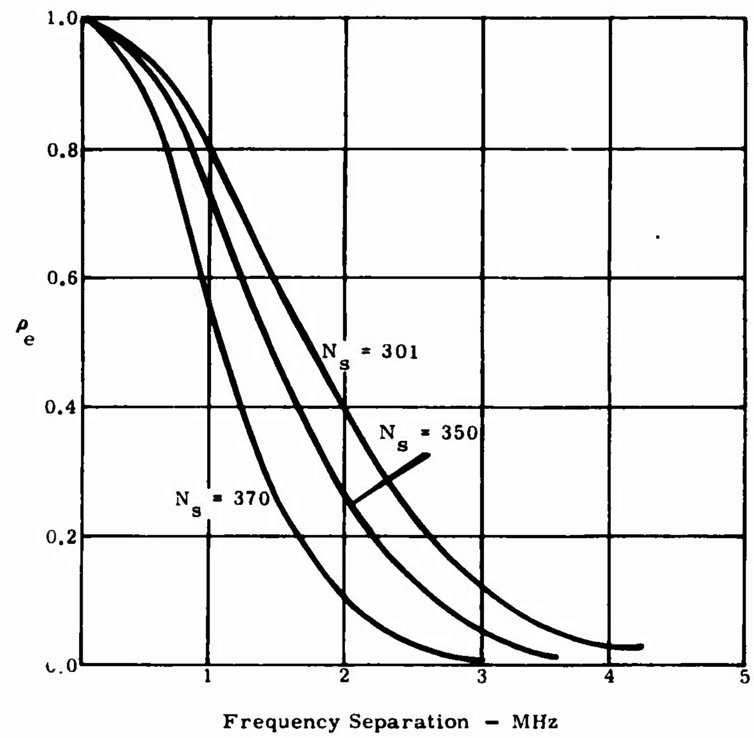


Figure 30. Change in Correlation Function Allowing Scatter Angle to Become a Function of N_s. Point Petre Receive Site.

J. COMPARISON OF CORRELATION BANDWIDTH MODEL WITH TEST RESULTS

To evaluate the correlation bandwidth model presented in the previous section, plots of the correlation coefficients predicted by the model and actual measured correlation coefficients for eight different paths are given in Figures 31 through 38. These eight paths vary in length from 58 miles to 200 miles. Take off angles ranging from 0.86 degrees to -0.46 degrees are included. Data from C- and X-bands are used for the actual values.

Four of the paths are those used in the test phase of this program. The effective beamwidth function was derived using the X-band lower deciles for these four paths. There is very good agreement between the predicted correlation bandwidths and the measured lower decile values on these paths (Figures 31 through 34). The minor variation between the model and experimental curves arises since the actual data was not strictly Gaussian. The agreement between measured and predicted upper deciles is also good with the exception of Ontario Center. This was the shortest path with the smallest scatter angle and suggests (as does the Tobyhanna-Hexagon data discussed below) that 0.4 S_t may fall to approximately 0.3 S_t for shorter paths. Alternatively, it may imply that the effective beamwidth was still less than the actual beamwidth for this short path. As discussed earlier, the values predicted by the model are the same for X- and C-band. These predicted values can be compared with C-band values plotted in the section of reduced data.

C-band data taken over a path from Verona, New York to Stony Point, New York, in August 1962 is plotted in Figure 35 along with the values predicted for this path[22]. The lower decile predicted by the model is about one megahertz wider in correlation bandwidth than the measured lower decile. The measured upper decile is narrower in correlation bandwidth than the predicted upper decile using a scale factor of 0.4

Figures 36 and 37 have measured C-band data taken in Florida[23]. Data for Figure 36 was obtained over the path from Tallahassee to Orlando during March and April 1963. The predicted lower decile correlation bandwidth agrees closely with the measured, but the measured upper decile bandwidth is considerably wider than predicted. Figure 37 has data plotted which was taken over a path from Gainesville to Orlando in May and June 1962. The values predicted for this path are much wider than the measured values. Over the Florida terrain considerable difference in the structure of the scatter volume from the New York area is to be expected. Some adjustment of the scale factor based on terrain could improve the model for paths of this type.

Tests run on C-band from February through July 1968 on the path from Tobyhanna to the Hexagon are plotted in Figure 38.[21] The predicted values are narrower than the measured correlation bandwidths. It should be pointed out, however, that this path has a small scatter angle and the function for effective beamwidth in terms of scatter angle becomes inaccurate or at least highly sensitive for small scatter angles. Some refinement of this function could lead to better predictions for short paths or for paths with negative take off angles.

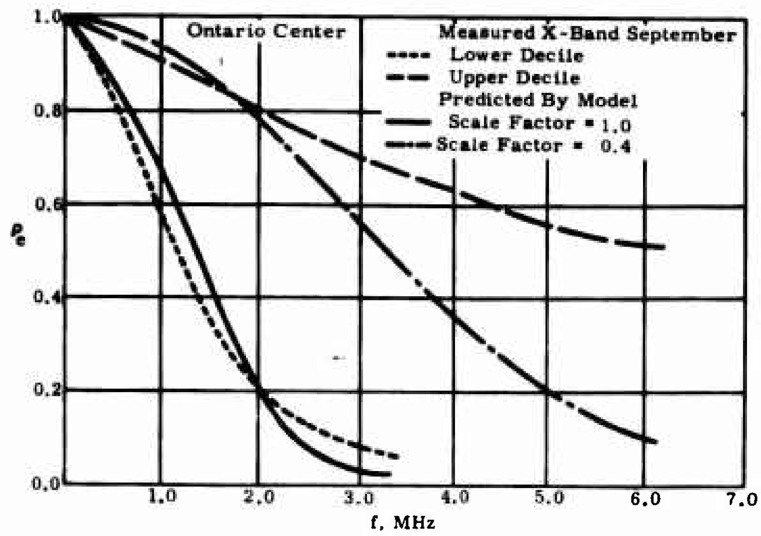


Figure 31. Measured X-Band, Summer, Ontario Center

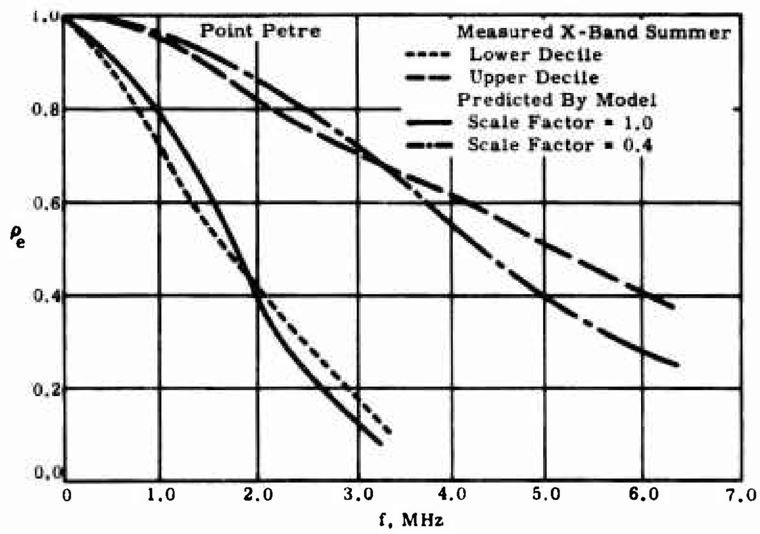


Figure 32. Measured X-Band, September, Point Petre

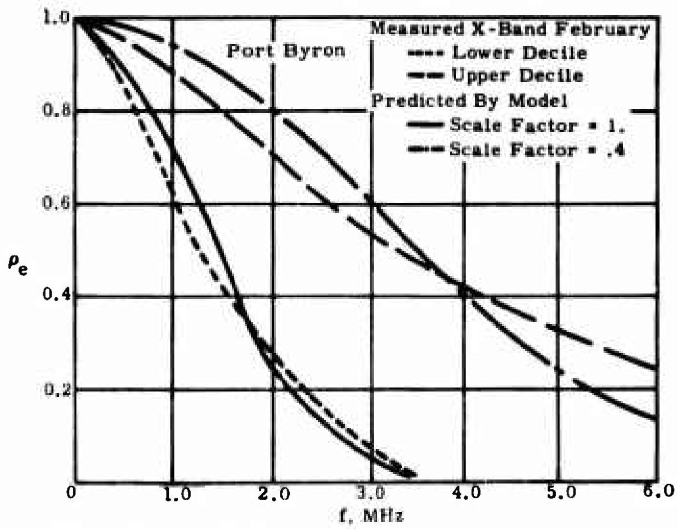


Figure 33. Measured X-Band, February, Port Byron

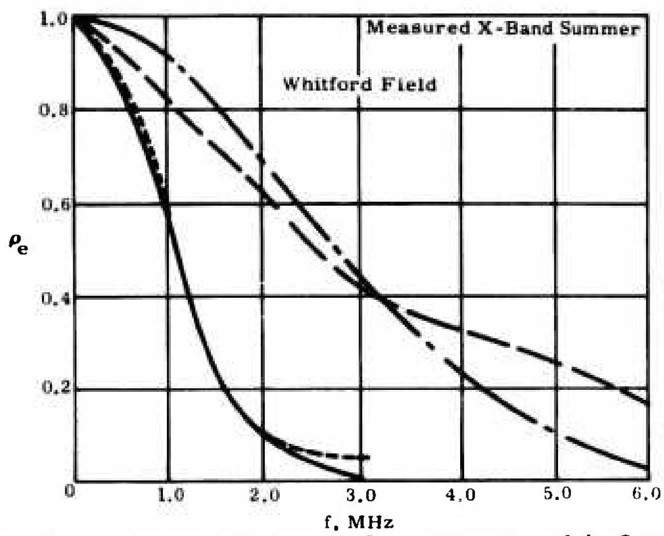


Figure 34. Measured X-Band, Summer, Whitford Field

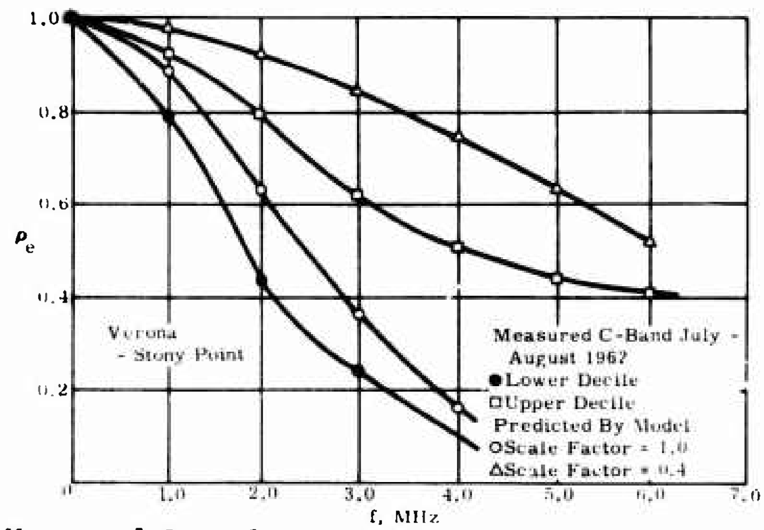


Figure 35. Measured C-Band, July and August 1962, Verona - Stony Point

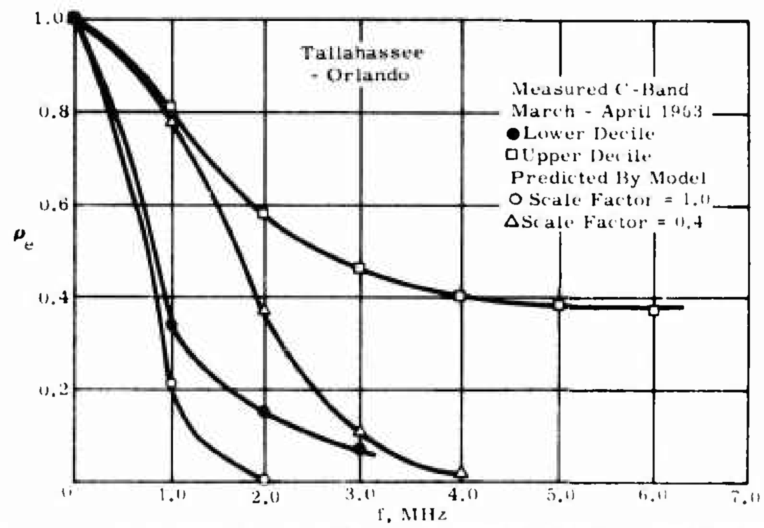


Figure 36. Measured C-Band, March and April 1963, Tallahassee - Orlando

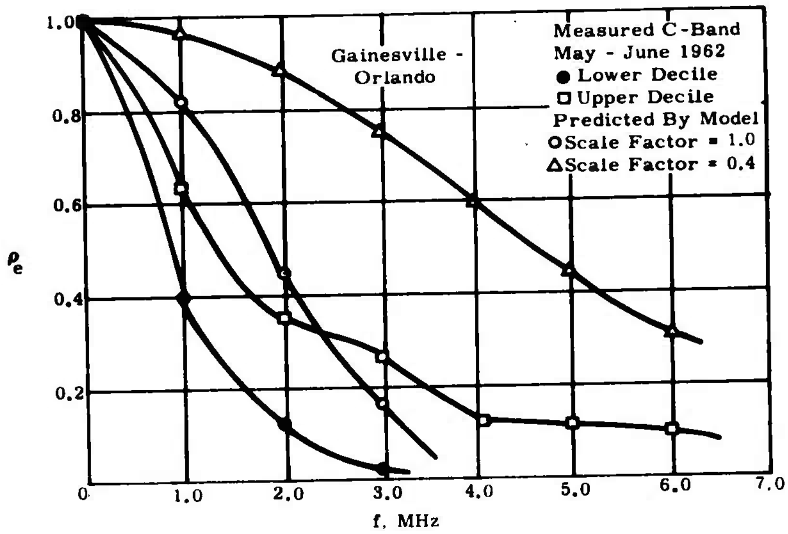


Figure 37. Measured C-Band, May and June 1962, Gainesville - Orlando

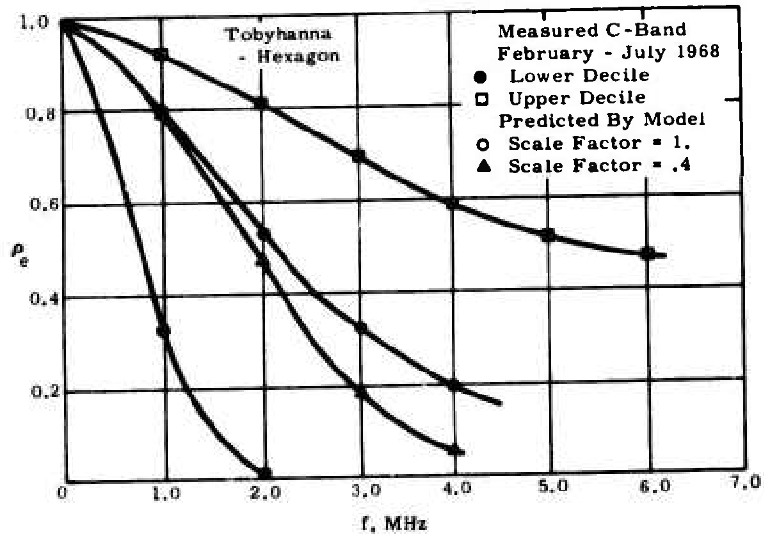


Figure 38. Measured C-Band, February through July 1968, Tobyhanna - Hexagon

III. FIELD TEST PROGRAM

The purpose of the field test program was to record signal strength data on tape over several troposcatter paths representative of the MALLARD links. From the recorded tapes the cross correlation coefficients versus frequency spacing and the fade statistics were later determined through computer processing. Particular emphasis was placed on obtaining data descriptive of effects due to terrain, path length, season, time of day, meterological conditions and frequency. These results were also used to update the analytical model for the prediction of correlation bandwidth. Three overland and one overwater path provided variations in terrain and path length. Seasonal variations were obtained by changing paths every few weeks over a seven month testing period from August 1969 through February 1970. The daily operating schedule was altered to provide information on the diurnal effects. Meterological conditions were recorded and are included in Appendices B and D. Throughout the program tests were conducted simultaneously on frequencies of 4.62 and 7.6 GHz to provide variations in frequency. Special tests were conducted over a narrow bandwidth to determine the shape of the correlation coefficient for small changes in frequency.

The transmitters and a ten foot diameter parabolic antenna were located at the RADC test site in Model City, New York (Figure 39). The receiving instrumentation was fully mobile and housed in a 32 foot trailer with special modifications to include a ten foot stowable antenna on top. Three receiver sites were visisted cyclically: Ontario Center, New York, Whitford Field near Weedsport, New York, and Point Petre, Ontario, Canada. A fourth site located atop a hill at Port Byron, New York, was added at the end of the program to provide data comparable with the Whitford Field path but with a lower antenna take off angle. All the test objectives were achieved with a bonus of data from the fourth receiving site at Port Byron, New York.

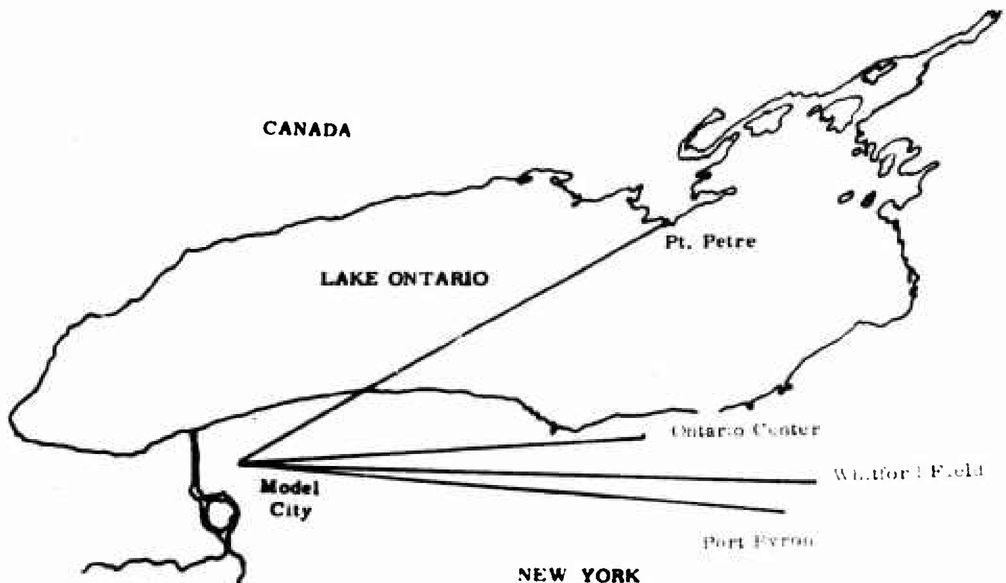


Figure 39. Troposcatter Paths

A. TRANSMITTER SITE

The transmitter site was located at the RADC Test Site at Model City, New York. The antenna (Figure 40) is mounted on the roof of the building housing the transmitter equipment and is at an elevation of 338 feet (102 meters) above sea level. The position of Model City is: Latitude: 43 deg, 12 min., 37.5sec North; Longitude: 78 deg, 59 min., 15.7sec West.

The Ontario Center to Model City link is a 140 kilometer path with the receiver located on a hill at the RADC Test Site Ontario Center, New York. Figure 41 is a view along the path from Ontario Center. Figure 42 is a partial propagational profile chart showing the first 15 miles from the receive and transmit antennas. Figure 43 is a complete propagational profile chart of the path. The first obstruction along the path occurred 5.2 miles from the receive antenna at an elevation of 545 feet above sea level.

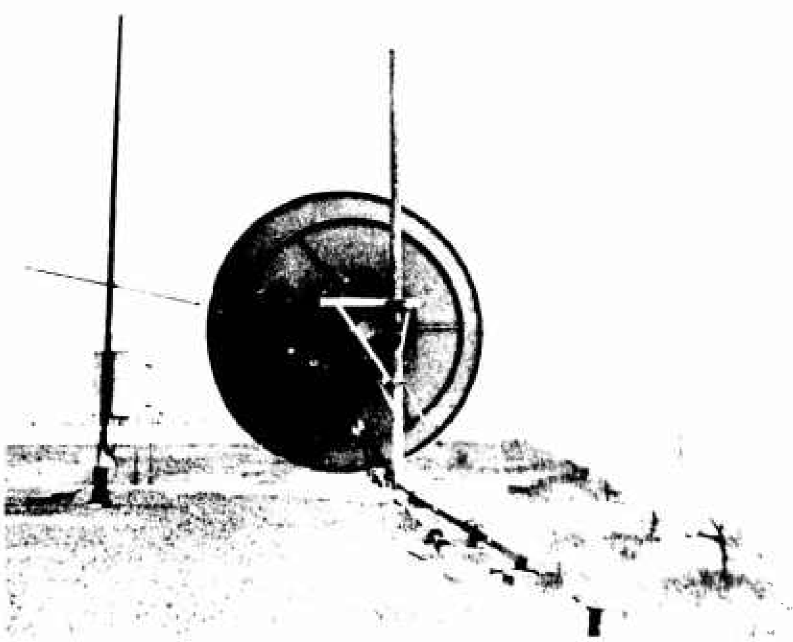


Figure 40. Antenna Installation at Model City, N. Y.

Figure 41. View Along Path From Ontario Center Toward Model City, N. Y.

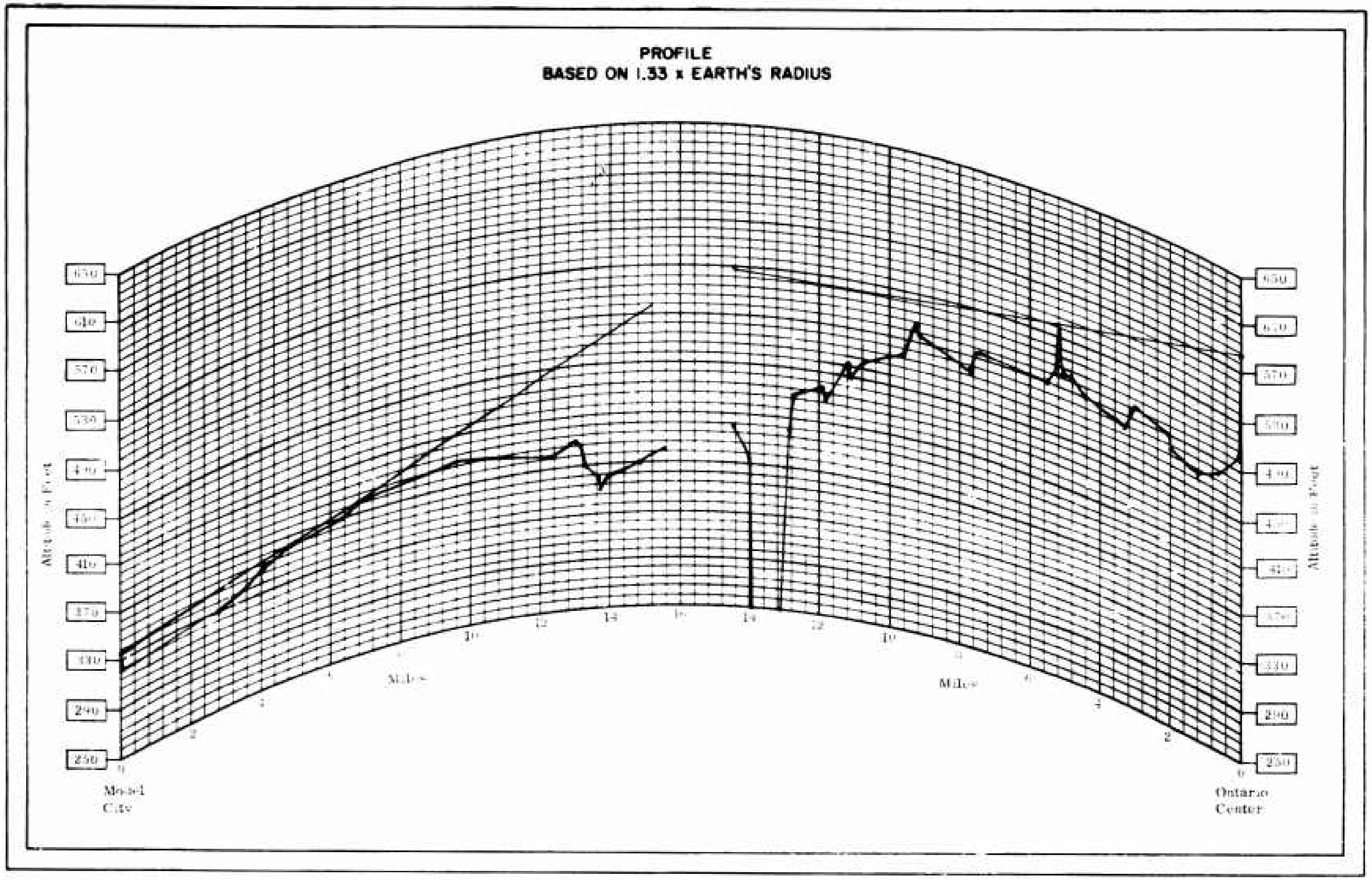


Figure 42. Partial Profiles of Model City to Ontario Center Path

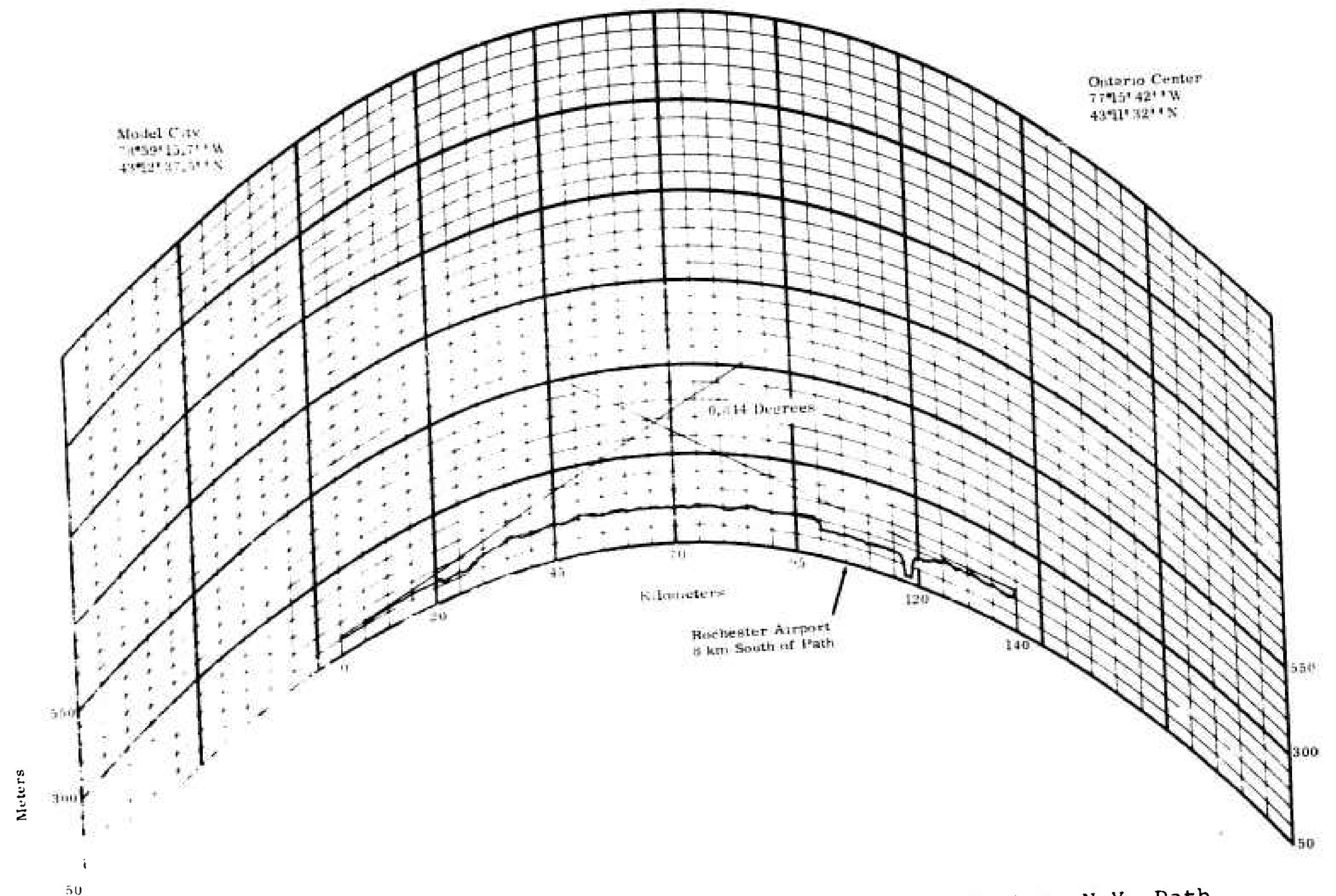


Figure 43. Metric Profile of Model City to Ontario Center, N.Y. Path

The first obstruction along the transmit path occurred 5.8 miles from the antenna at an elevation of 380 feet above sea level.

This path is traversed by many aircraft entering and leaving the Rochester area. Aircraft in the path caused no problem in reducing the data as the data reduction process was designed to permit exclusion of aircraft interference.

The weather conditions at Ontario Center and Model City were usually similar to each other throughout the test period.

Significant path parameters for this link are:

Position of Ontario Center:

Latitude:	43 degrees, 11 min., 32sec North
Longitude:	77 degrees, 15 min., 42sec West
Antenna Altitude:	178.6 meters

Path length:	86.89 statute miles, 139.8 km
Bearing to Model City:	271.4 degrees true
Bearing to Ontario Center:	90.2 degrees true
Ontario Center takeoff angle:	-0.12 degrees
Model City takeoff angle:	0.02 degrees
Scatter angle:	0.844 degrees
Path loss:	4.62 GHz, 215.5 dB 7.6 GHz, 222.9 dB

The Point Petre to Model City link is a 163 kilometer overwater path. The receiver site was located on the shore of Lake Ontario at Point Petre' Ontario, Canada (Figure 44). This site afforded an unobstructed view as the receiver van was parked only a few feet from the shore. Figures 45 and 46 are partial and complete propagational profile charts of the path. The receive antenna was at an elevation of 245 feet above sea level with the path grazing the water approximately 5 miles from the antenna. The first obstruction along the transmit path occurred 7.6 miles from the antenna at an elevation of 340 feet above sea level.

Aircraft interference was rarely observed on this path.

The weather conditions at Point Petre and Model City were similar to each other during the summer testing. However, during the winter (December and January) there were days with noticeable differences in weather conditions. The general weather condition for these days was a northerly wind with the temperature at Point Petre 10 to 25 degrees colder than Model City.

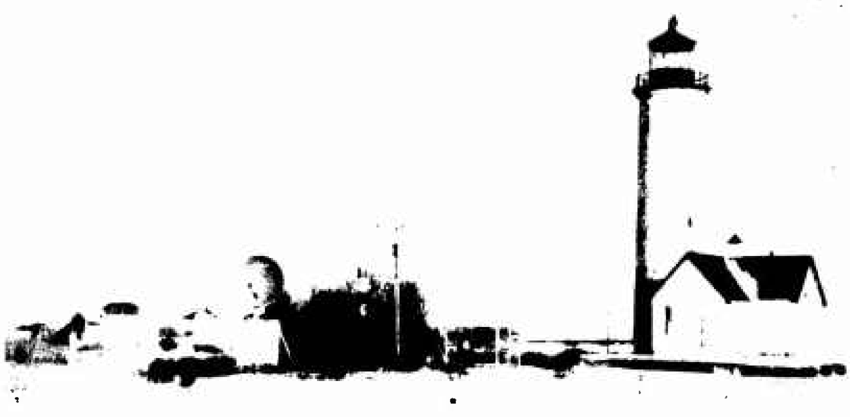


Figure 44. Point Petre Receiving Site

Significant parameters for this link are:

Position of Point Petre :

Latitude:	43 degrees, 50 min., 22sec North
Longitude:	77 degrees, 9 min., 16sec West
Antenna Altitude:	80.77 meters
Path length:	101.5 statute miles, 163.4 km
Bearing to Model City:	245.3 degrees true
Bearing to Point Petre :	64.0 degrees true
Point Petre takeoff angle:	-0.06 degrees
Model City takeoff angle:	-0.03 degrees
Scatter angle:	1.011 degrees
Path loss:	4.62 GHz, 219.5 dB 7.6 GHz, 227.1 dB

The Whitford Field to Model City link is a 199 kilometer overland path. The receive site was located at Whitford Field near Weedsport, New York. Figure 47 is an aerial photograph of the site with a major obstruction along the path marked. This was a marginal path as there were two major obstructions near the antenna. The first obstruction was a hedgerow 1,500 feet from the antenna. This obstruction was eliminated by cutting a path through the trees after the antennas were aligned in azimuth. The second obstruc-

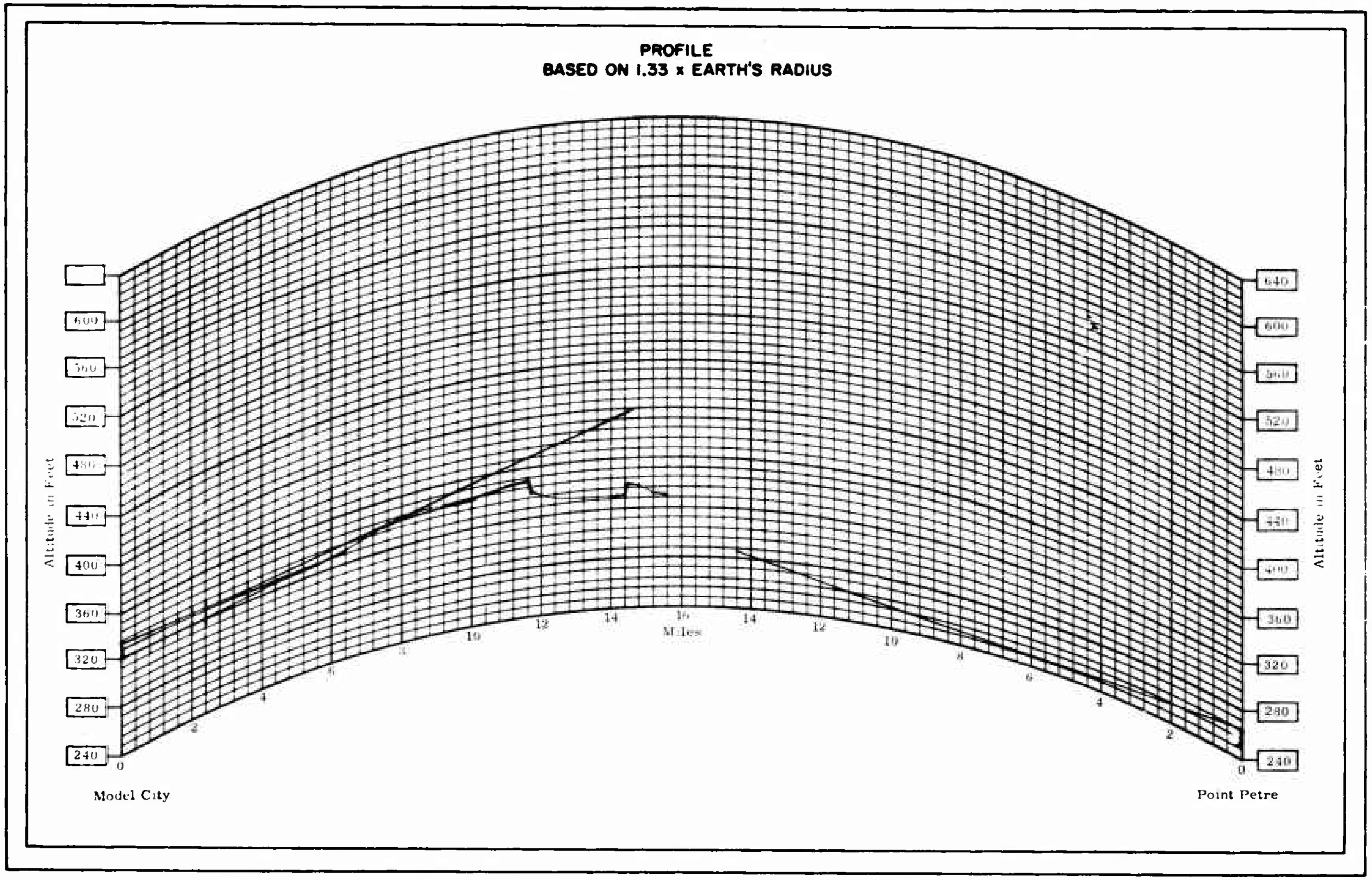


Figure 45. Partial Profile of Model City to Point Petre Path

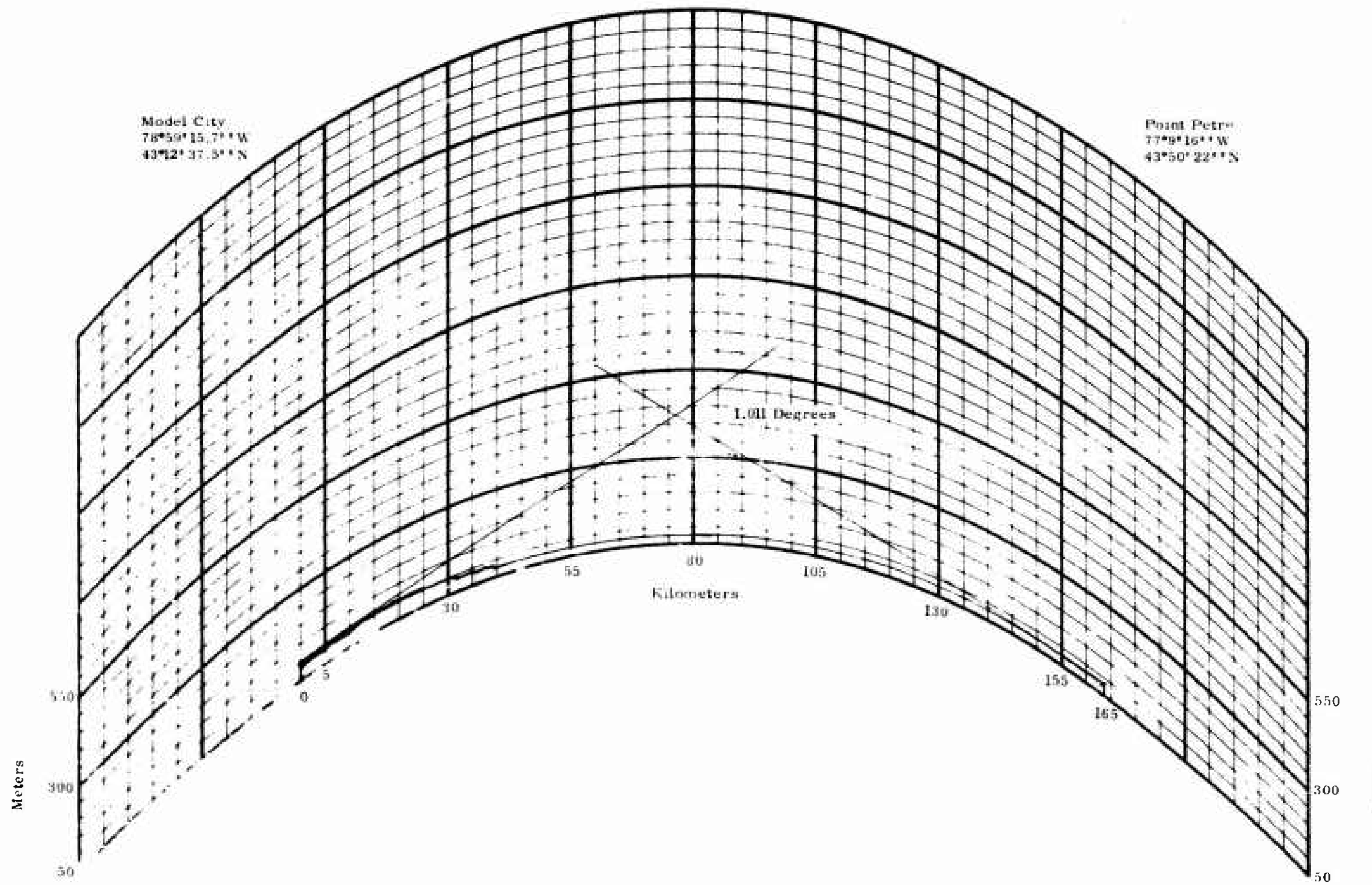


Figure 46. Metric Profile of Model City to Point Petre Path

Figure 47. Whitford Field

tion was also caused by trees 2,000 feet from the antenna. A path could not conveniently be cut through these trees as there were too many. The trees caused the takeoff angle to be 0.862 degrees or 0.442 degrees greater than first calculated. Figures 48 and 49 are partial and complete propagational profile charts of the path. The receive antenna was at an elevation of 410 feet above sea level with the first obstruction occurring 2,000 feet from the antenna at an elevation of 440 feet above sea level. The first obstruction along the transmit path occurred 5.0 miles from the antenna at an elevation of 370 feet above sea level.

Aircraft interference on this path was present 5 to 10 percent of the time. The center of the beam passed within one mile of the Rochester airport and the lower ray was at an altitude of 2,700 feet above sea level.

The weather conditions at Whitford Field and Model City were usually similar throughout the test period.

Significant path parameters for this link are:

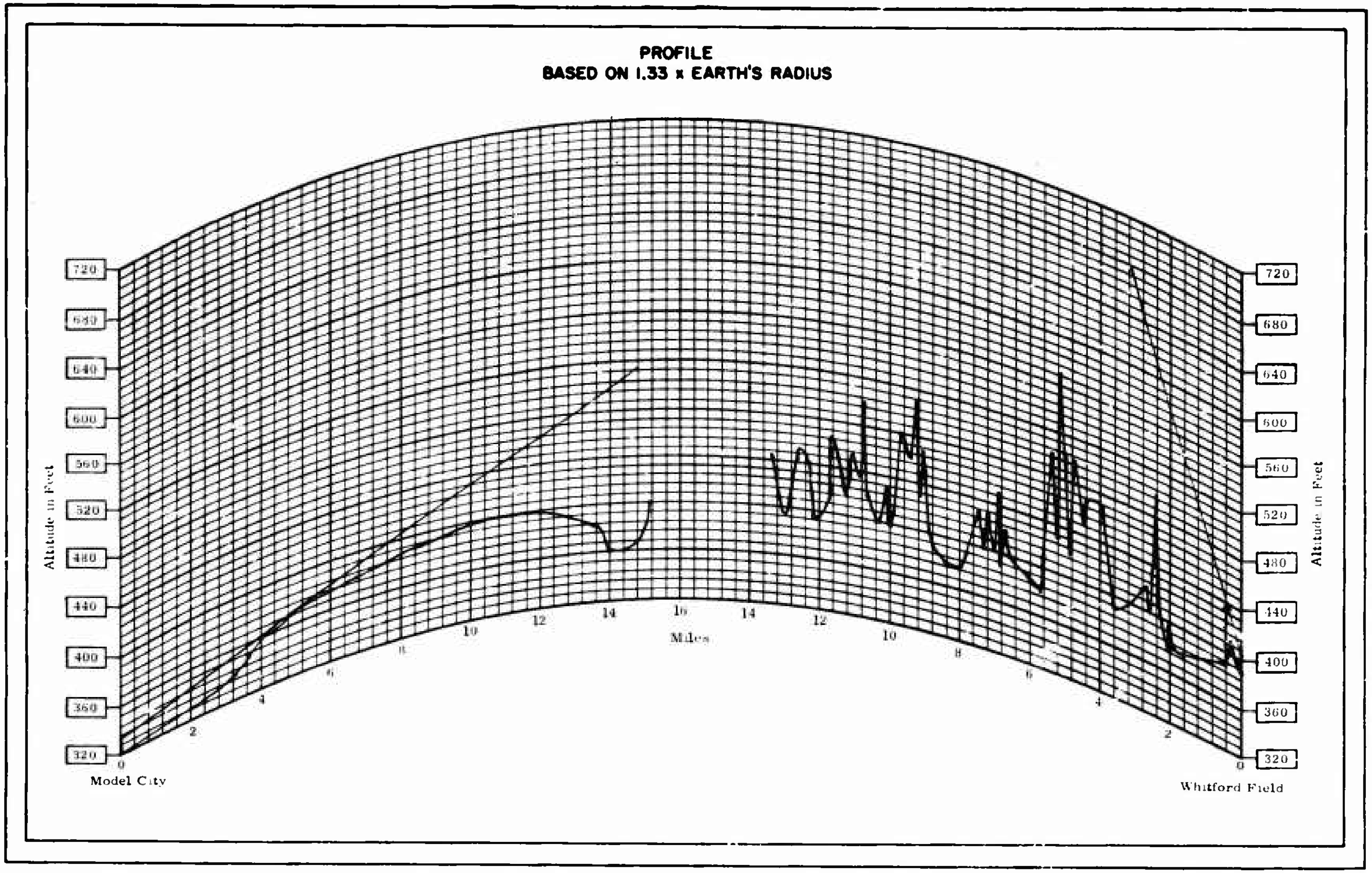


Figure 48. Partial Profile of Model City to Whitford Field Path

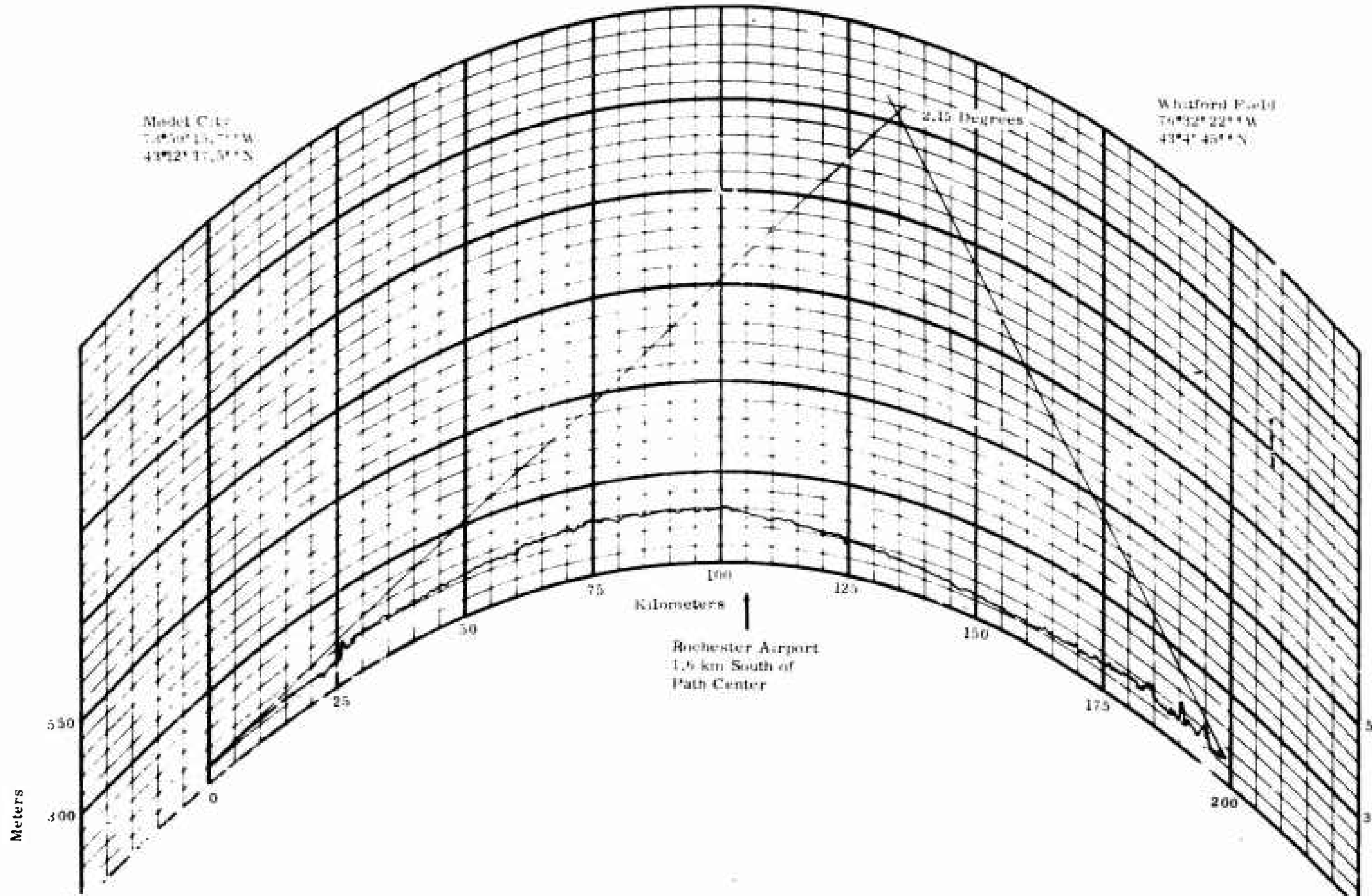


Figure 49. Metric Profile of Model City to Whitford Field Path

Position of Whitford Field:

Latitude:	43 degrees, 4 min., 45sec North
Longitude:	76 degrees, 32 min., 22sec West
Antenna Altitude:	

Path length:	123.7 statute miles, 199.2 km
Bearing to Model City:	275.0 degrees true
Bearing to Whitford Field:	93.3 degrees
Whitford Field takeoff angle:	0.862 degrees
Model City takeoff angle:	0.05 degrees
Scatter angle:	2.15 degrees
Path loss:	4.62 GHz, 232.1 dB 7.6 GHz, 240.0 dB

The Port Byron to Model City link is a 192 kilometer path with the receiver van located on top of a hill in Port Byron, New York (Figure 50). This site was used to obtain comparative data over a path similar to the Whitford Field to Model City path. Figures 51 and 52 are partial and complete propagational profile charts of the path. The receive antenna was at an altitude of 564 feet above sea level with the first obstruction along the receive path occurring 12 miles from the antenna at an elevation of 620 feet above sea level. The first obstruction along the transmit path occurred 6.2 miles from the antenna at an elevation of 392 feet above sea level.

Aircraft interference was more numerous on this path than on any of the other paths. Aircraft interference though eliminated in data reduction was present in 30 percent of the raw data. The center of the beam passed directly over the Rochester airport, and the lower ray was at an altitude of 1900 feet above sea level. The intersection of the lower rays occurred 8.1 miles west of the airport.

Complete weather information at Port Byron was not available as the closest weather services were located at Syracuse (40 miles) and Rochester (50 miles). The Rochester weather service was used since the common volume was close to the weather bureau.

Significant path parameters are listed below:

Position of Port Byron:

Latitude:	43 degrees, 2 min., 2.4sec North
Longitude:	76 degrees, 37 min., 51.6sec West
Antenna Altitude:	184 meters, 564 feet

Position of Whitford Field:

Latitude:	43 degrees, 4 min., 45sec North
Longitude:	76 degrees, 32 min., 22sec West
Antenna Altitude:	

Path length:	123.7 statute miles, 199.2 km
Bearing to Model City:	275.0 degrees true
Bearing to Whitford Field:	93.3 degrees
Whitford Field takeoff angle:	0.862 degrees
Model City takeoff angle:	0.05 degrees
Scatter angle:	2.15 degrees
Path loss:	4.62 GHz, 232.1 dB 7.6 GHz, 240.0 dB

The Port Byron to Model City link is a 192 kilometer path with the receiver van located on top of a hill in Port Byron, New York (Figure 50). This site was used to obtain comparative data over a path similar to the Whitford Field to Model City path. Figures 51 and 52 are partial and complete propagational profile charts of the path. The receive antenna was at an altitude of 564 feet above sea level with the first obstruction along the receive path occurring 12 miles from the antenna at an elevation of 620 feet above sea level. The first obstruction along the transmit path occurred 6.2 miles from the antenna at an elevation of 392 feet above sea level.

Aircraft interference was more numerous on this path than on any of the other paths. Aircraft interference though eliminated in data reduction was present in 30 percent of the raw data. The center of the beam passed directly over the Rochester airport, and the lower ray was at an altitude of 1900 feet above sea level. The intersection of the lower rays occurred 8.1 miles west of the airport.

Complete weather information at Port Byron was not available as the closest weather services were located at Syracuse (40 miles) and Rochester (50 miles). The Rochester weather service was used since the common volume was close to the weather bureau.

Significant path parameters are listed below:

Position of Port Byron:

Latitude:	43 degrees, 2 min., 2.4sec North
Longitude:	76 degrees, 37 min., 51.6sec West
Antenna Altitude:	184 meters, 564 feet

Figure 50. Port Byron Site

Path Length:	119 statute miles, 192 km
Bearing to Model City:	266.7 degrees true
Bearing to Port Byron:	95.0 degrees true
Model City takeoff angle:	0.49 degrees
Port Byron takeoff angle:	-0.083 degrees
Scatter angle:	1.335 degrees
Path loss:	4.62 GHz, 222.4 dB 7.6 GHz, 230.2 dB

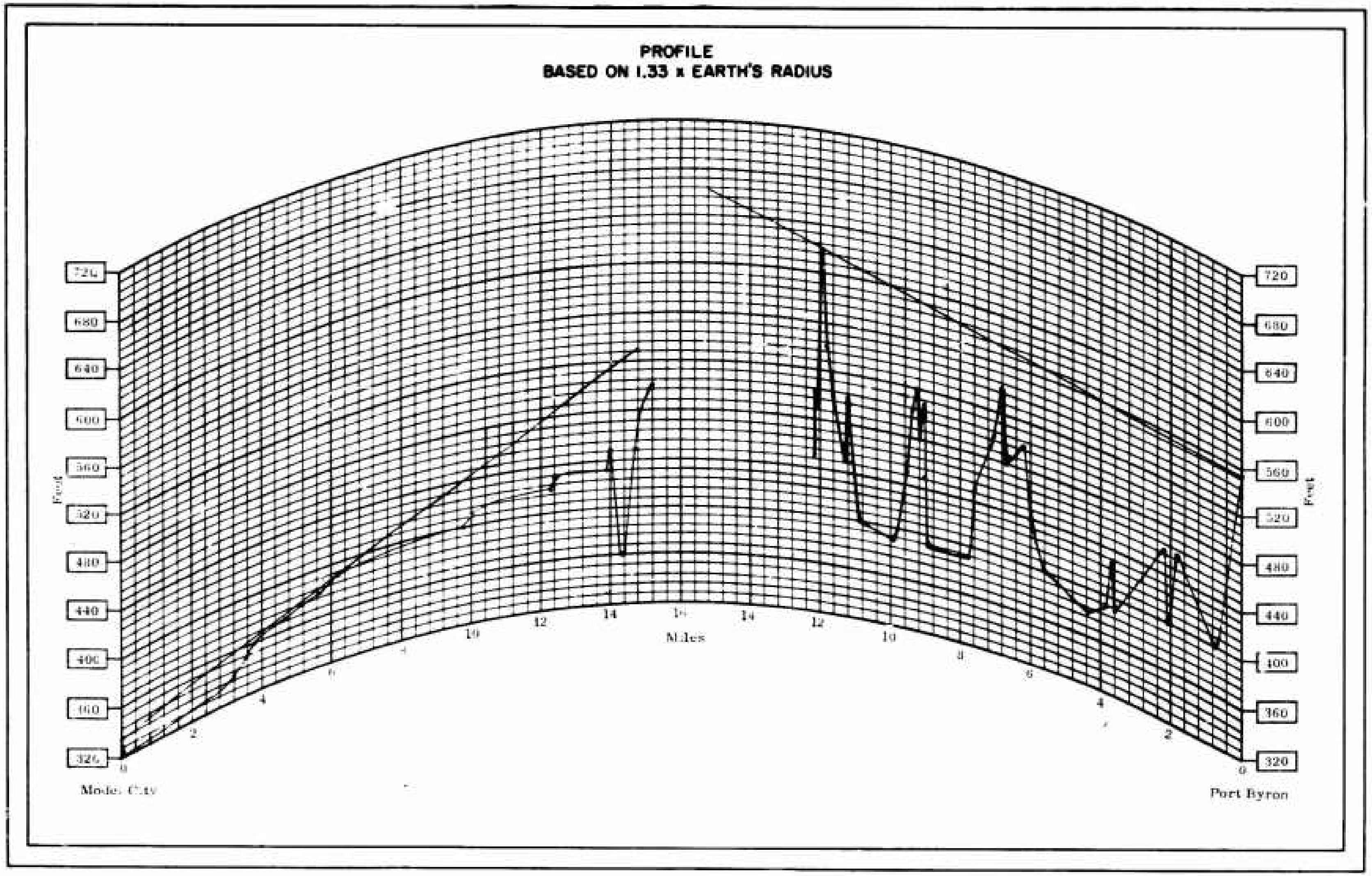


Figure 51. Partial Profile of Model City to Port Byron Path

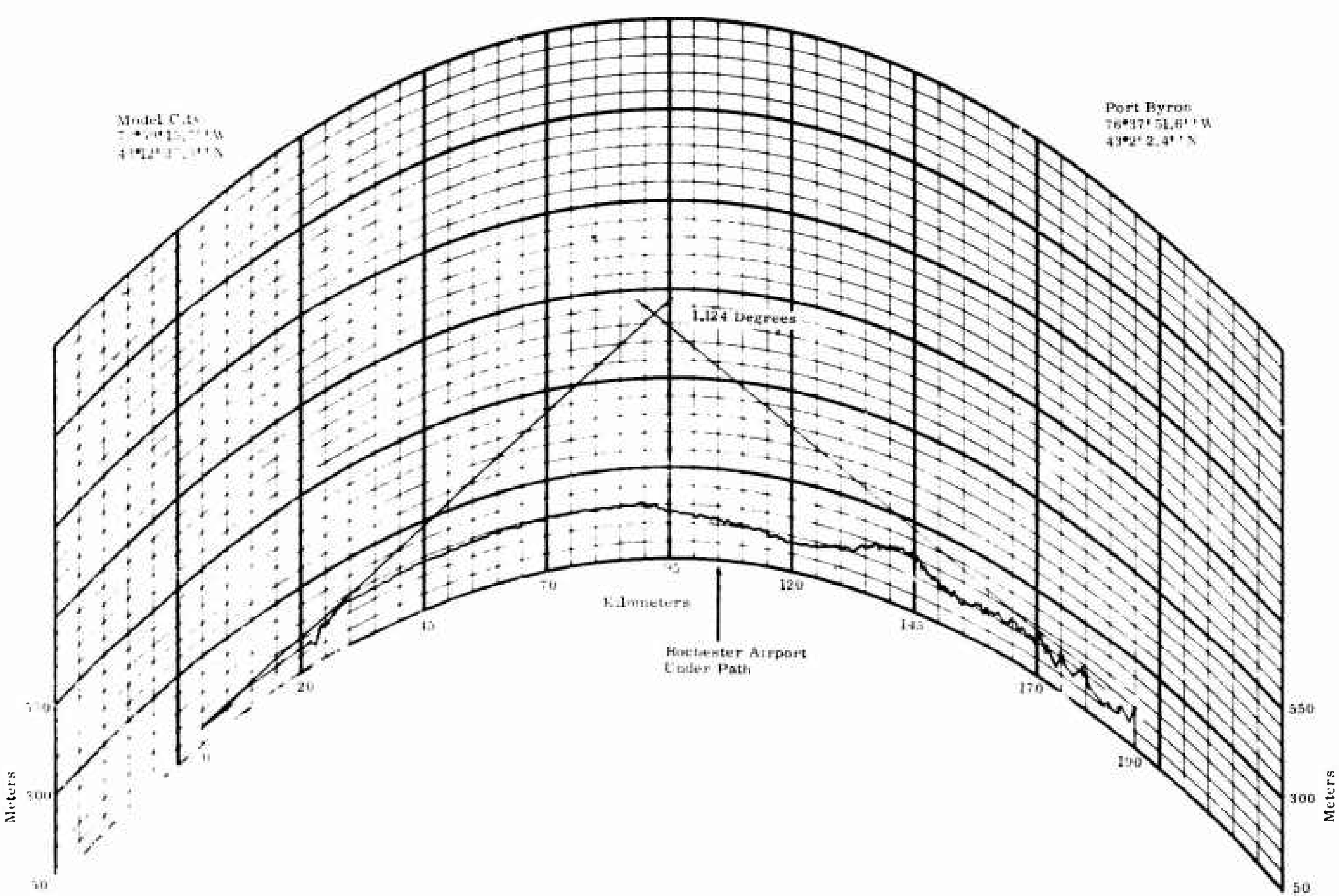


Figure 52. Metric Profile of Model City to Port Byron Path

B. TRANSMITTER INSTRUMENTATION

The transmitting instrumentation was located in the RADC building at Model City, New York. X-band signals at 7.6 GHz and 1000 watts were provided by an FRC-68 transmitter which was permanently installed in the building. The C-band signals at 500 watts were provided by an AN/GRC-66 transmitter with power amplifier. Two types of modulation were used to provide output signals that were effectively multiple carrier. A system of cyclically pulsing two sets of five gated oscillators with a 100 microsecond dwell on each frequency was used to yield signals that were incrementally separated from 1 to 9 MHz. An FM signal was also used at a modulation index of 1.841 and 200 kHz to enable correlation coefficient measurements for small increments in frequency.

The transmitting equipment (Figure 53) transmits on both C- and X-bands simultaneously. In the wideband mode, the oscillator stepper gates each of the five oscillators cyclically into the 70 MHz input of each transmitter. The oscillator frequencies for the X-band modulation pattern are 65.5, 66.5, 69.5, 72.5, and 74.5 MHz. This separation after amplification and translation in the FRC-68 transmitter results in stepped carriers separated by 1, 4, 7, and 9 MHz from the lower frequency. The stepped carriers have a peak power of 1000 watts and a duty cycle of 0.2. This method of pulsing results in only one frequency being amplified by the transmitter power amplifier at a time and thus there are no intermodulation products generated.

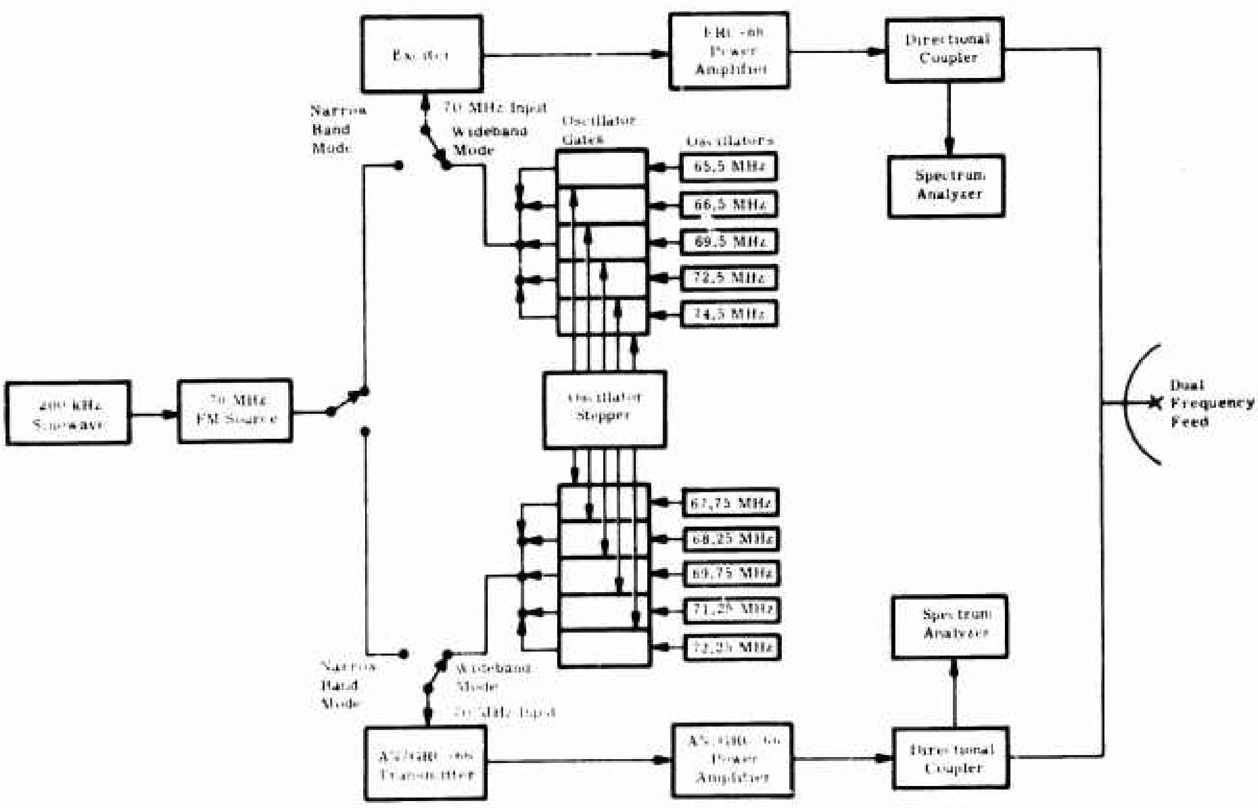


Figure 53. Transmitting Equipment

The C-band AN/GRC-66 transmitter goes through one doubling process prior to the final output. Thus a second set of oscillators having separations half that of the other equipment was provided. These frequencies were 67.75, 68.25, 69.75, 71.25, and 72.25 MHz. A spectrum analyzer was used in each system for monitoring the RF output spectrum and as an aid in adjusting the equipments. The output signals of the two transmitter power amplifiers were connected through waveguide to a dual frequency feed to illuminate a 10 foot parabola mounted on the roof of the building (Figure 54).

The narrow band mode used the standard FM inputs of both transmitters. These were set to a modulating frequency of 200 kHz at an index of 1.841 to produce the set of five significant spectral lines separated by 200 kHz and having amplitude differences of about 5 dB.

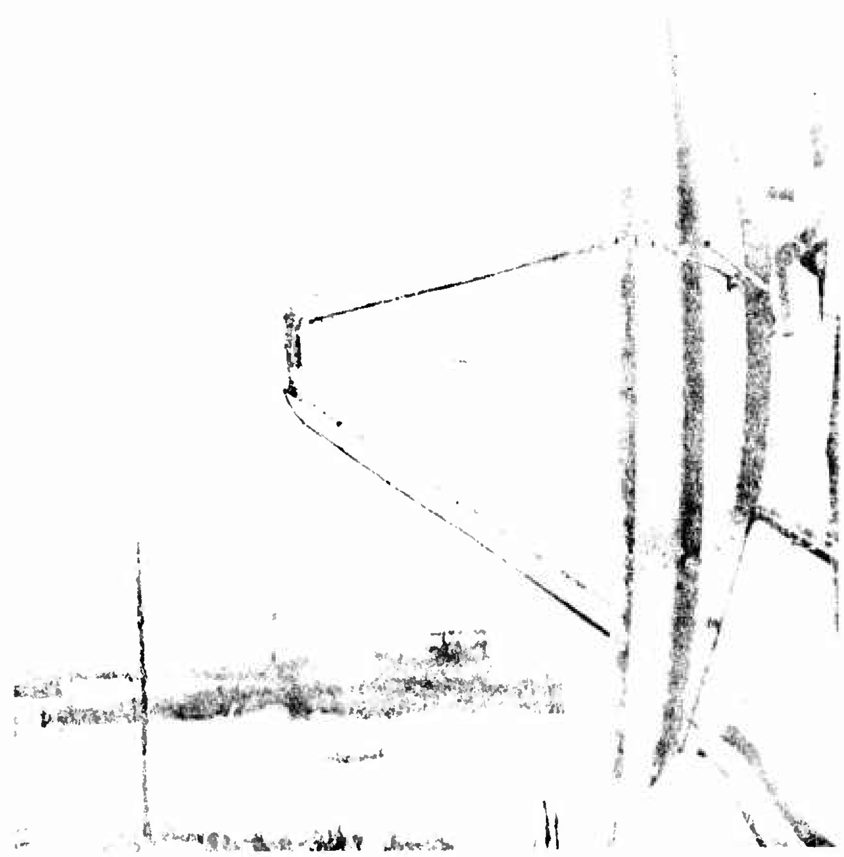


Figure 54. Antenna with Dual Frequency Feed

The antenna characteristics are given in the table below:

Table III. ANTENNA CHARACTERISTICS

Antenna
Diameter - 10 feet

Frequency (GHz)	3 dB BW (deg) E	3 dB BW (deg) H	Gain (dB)	VSWR	First Side Lobe (dB) E	First Side Lobe (dB) H
4.62	1.5	1.4	41.2	1.28	-26	-20
7.60	1.07	0.92	43.9	1.04	-26	-19

Note: Tests conducted at the Martin Marietta Antenna and Microwave Laboratory showed no deviations from concentricity between the C- and X-band beams.

C. RECEIVING INSTRUMENTATION

All receiver and data recording equipment necessary to operate the receiver site was mounted in a 32-foot van (Figure 55). The receiver site block diagram is shown in Figure 56. A 10-foot parabolic reflector with a dual frequency feed, similar to a dual frequency transmitter feed was mounted on the roof of the van with its structural support through the trailer to the frame. The dish was adjustable between -3 and +7 degrees in elevation and 360 degrees in azimuth. In transit, the feed was removed and the antenna was lowered in a horizontal position. The dual frequency feed permitted simultaneous reception at 4.62 and 7.6 GHz. The AN/GRC-66 and the FRC-68 receivers were adjusted to an overall bandwidth of 10 MHz. No AGC action takes place in the units.

For signal strength measurements with the wideband frequency spacings, the 70 MHz IF outputs of the receivers were connected through two 5-port multicouplers to 10 individual IF amplifiers. These amplifiers were tuned to center frequencies of 65.5, 66.5, 69.5, 72.5 and 74.5 MHz. Signal strength measurements using the narrow frequency spacings required a second conversion of the 70 MHz output. This was accomplished by mixing the 70 MHz output with a 63.5 MHz crystal oscillator to give an output around 6.5 MHz. These signals were routed through a 5-port multicoupler to five R390A-URR general purpose receivers with bandwidths of 10 kHz and center frequencies which were easily adjusted to 6.10, 6.30, 6.50, 6.70, and 6.90 MHz.

The AGC voltages, which are indications of signal strength, from the 10 IF amplifiers and/or the five separate R390 receivers were routed through 15 operational amplifiers. The amplifiers were adjusted so that the outputs varied between ±2.00 volts for a 50 dB change in signal strength.

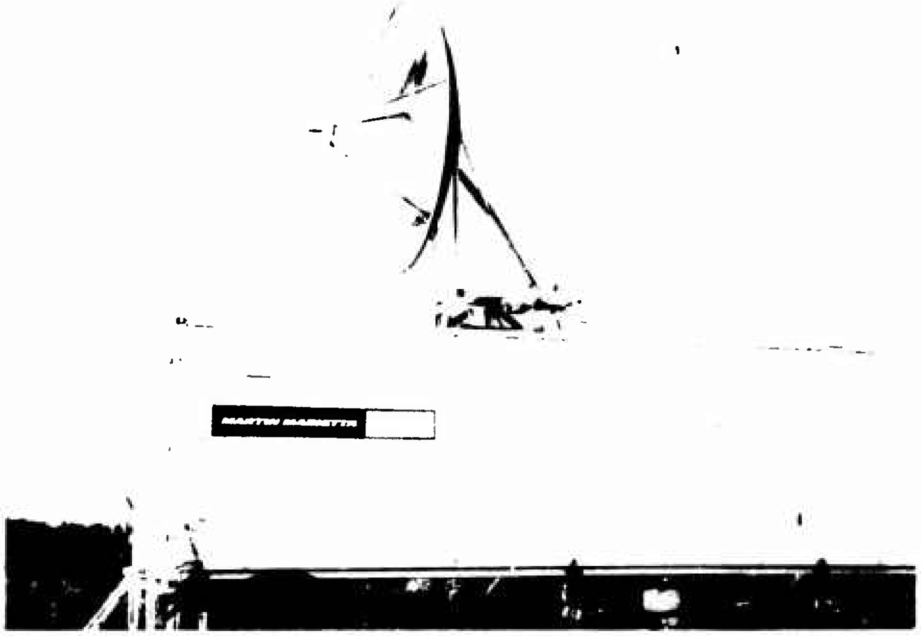


Figure 55. Receiving Instrumentation Van

Ten of the signal conditioner outputs are routed through the automatic test identity and control panel to 60 Hz notch filters. These filters remove any 60 Hz residual hum in the system. These active notch filters are only a few Hertz wide at 60 Hz. Outputs from the notch filters are inserted into the FM recording oscillators which are part of the 0.6 ips tape recorder. These oscillators are linear in their input/output characteristics. The FM record oscillators were adjusted so that an input between ±2.00 volts caused the output to vary between 740 and 340 Hz. Parallel outputs from the notch filters also go to a strip chart recorder that provides a visual, on-site estimation of fade rates and a check on system performance.

The automatic test identity and control panel was provided to insert the test number and weather data directly on the tape to avoid any discrepancies between test logs, etc. The control panel also automatically controlled the sequence of events from start to finish of each test.

The overall receiver to tape recorder calibration curve was provided to the Martin Marietta computer so that the resulting data could be related to real time signal strengths in dBm. The narrow band calibration was performed with a 70 MHz signal generator to generate CW signals of known signal strength into the 70 MHz input of the narrow band system. Calibration of the wideband receiving system was accomplished using a pulsed signal generator at 4.62 or 7.6 GHz at the RF input to the receivers.

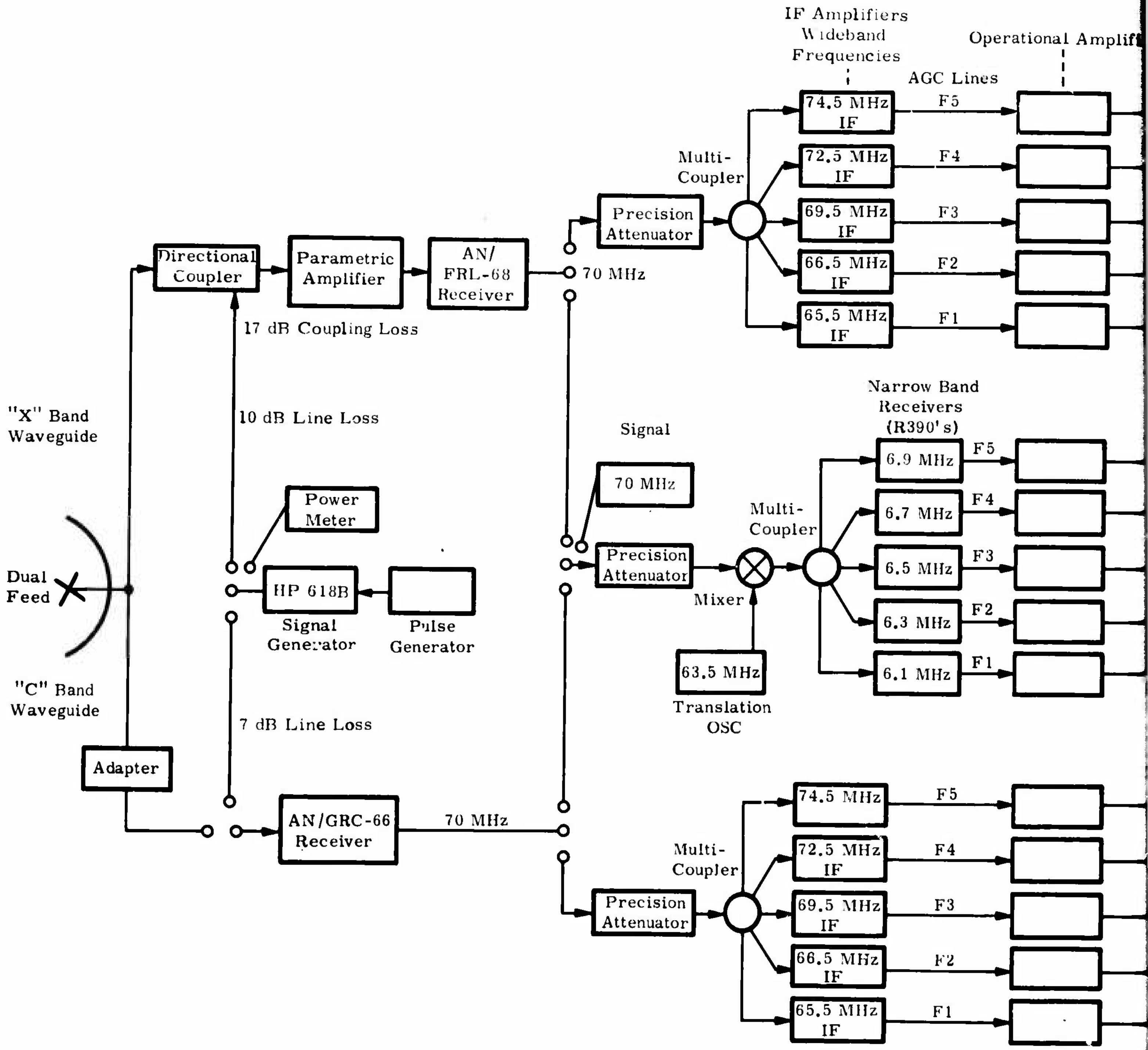
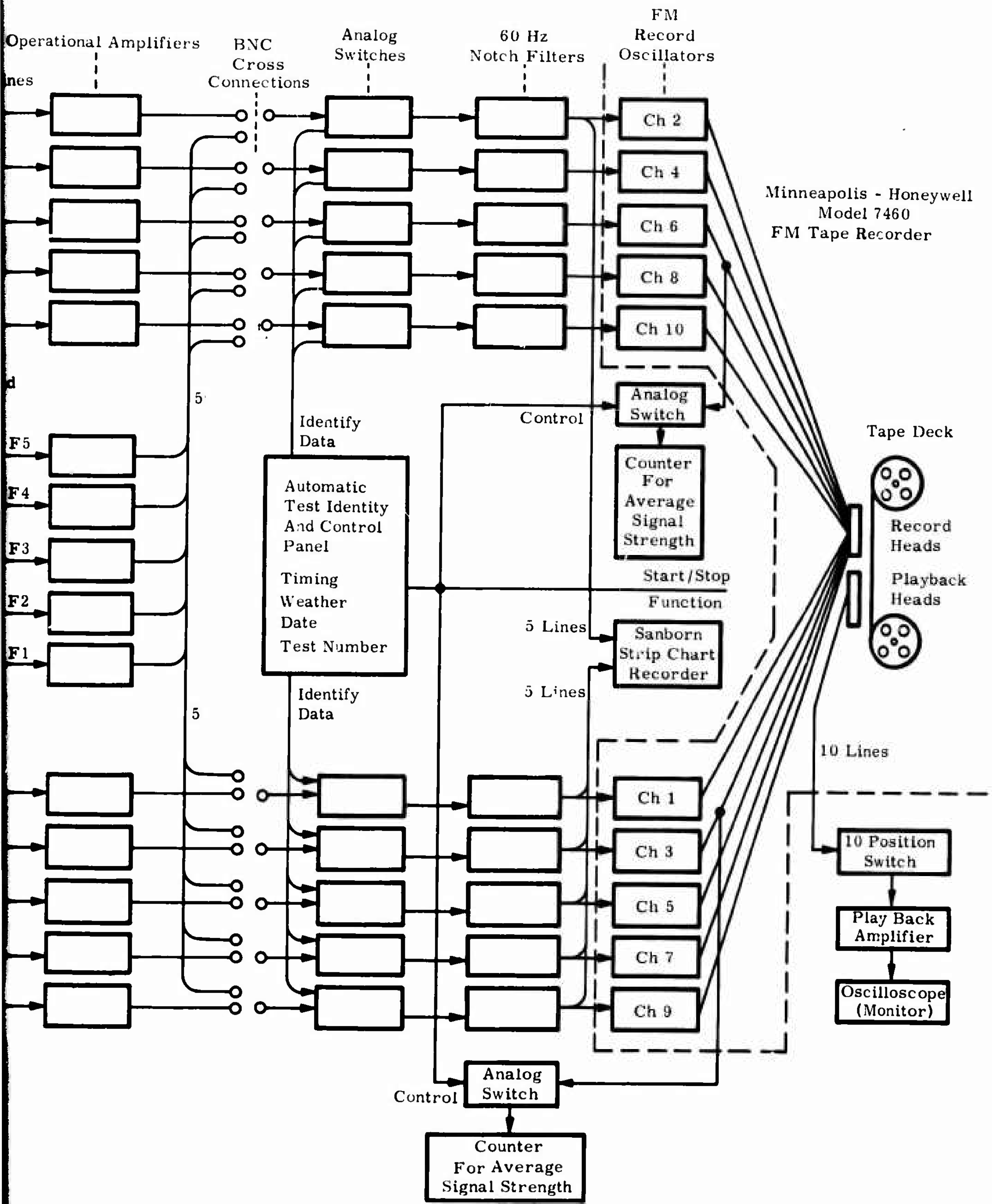


Figure 56. Receiving Instrumentation



Operational Amplifiers
BNC Cross Connections
Analog Switches
60 Hz Notch Filters
FM Record Oscillators
nes
Ch 2
Ch 4
Ch 6
Ch 8
Ch 10
Minneapolis - Honeywell Model 7460 FM Tape Recorder
d
5
F5
F4
F3
F2
F1
Identify Data
Control
Analog Switch
Counter For Average Signal Strength
Tape Deck
Automatic Test Identity And Control Panel
Timing
Weather
Date
Test Number
Start/Stop Function
Record Heads
Playback Heads
5 Lines
Sanborn Strip Chart Recorder
5 Lines
Identify Data
5
10 Lines
Ch 1
Ch 3
Ch 5
Ch 7
Ch 9
10 Position Switch
Play Back Amplifier
Oscilloscope (Monitor)
Control
Analog Switch
Counter For Average Signal Strength

2

D. ANTENNA ALIGNMENT

The receive antenna was aligned to the transmit antenna by a coarse boresight procedure and by the use of the maximum of maxima method. The first step in the alignment was to use a hand compass at both receiver and transmitter sites to obtain coarse azimuth settings. The boresight was then used for the coarse elevation settings. The accuracy of these settings was usually ± 3 degrees in azimuth and ± 1.5 degrees in elevation. The transmitter was then set up to transmit a 7.6 GHz CW signal with a 69.5 MHz output from the receiver. The receive antenna was then swept in the azimuth plane across the transmitted beam. A strip chart recording of the 69.5 MHz IF amplifier AGC was made during the sweep. The receive antenna was then set at the position where the strongest received signal occurred and the position of the antenna was logged. The same procedure was then performed on the transmit antenna. The overall procedure served to align the antennas within ± 0.75 degrees of final alignment. The average signal strength was measured. The receive antenna was then swept across the beam in steps of 0.3 degrees. The antenna position and average signal strength was recorded for each step. The transmit antenna was then moved 0.5 degrees to the left or the right. The receive antenna is again swept through the beam in 0.3 degree steps with antenna position and average signal strength recorded. This process was repeated in smaller increments until there was no further improvement in received signal. The transmit and receive antennas were then locked down in the azimuth plane. The same procedure was used for the elevation plane.

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IV. DATA COLLECTION

During the testing period from August 1969 through February 1970 data were collected over the troposcatter paths. The signal strength data were recorded on magnetic tape covering both C- and X-bands simultaneously during the conventional wideband tests. The special narrow bandwidth tests were made singly since only one set of five narrowband R390 communications receivers were available for the program and 10 receivers would have been required for simultaneous measurements. Supporting data were also required. Weather records were obtained from the Weather Bureau at Rochester, New York. These are included in Appendix B. Weather data during each test was also obtained on a real-time basis by telephone from the Buffalo, New York, Rochester, New York, and the Trenton, Ontario Weather Bureaus. The real time weather data was inserted on the tapes and/or included in the operator's test log. These data are included among other data in Appendix D, Test Records. Average signal strength was obtained from a counter whose input from one of the FM record oscillators represented the time varying signal strength. This figure was entered in the operator's log. The actual median signal strength was obtained through the computer reduction. The median value of each test reduced is posted in Appendix D.

The schedule of operation at the various sites was planned to provide a representation of seasonal variations as well as terrain variations. Table IV is a list of the sites and the testing periods at each. The last site listed is Port Byron which is a site similar in path length to the Whitford Field site, with the exception of a lower antenna takeoff angle.

Table IV. SITE OPERATION SCHEDULE

Ontario Center, Summer	August 4, 1969, through August 20, 1969
Whitford Field, Summer	August 26, 1969, through September 9, 1969
Point Petre, September	September 15, 1969, through September 26, 1969
Ontario Center, October	October 1, 1969, through October 24, 1969
Whitford Field, November	October 29, 1969, through November 18, 1969
Point Petre, Winter	December 2, 1969, through January 15, 1970
Ontario Center, Winter	January 22, 1970, through February 5, 1970
Port Byron, February	February 7, 1970, through February 26, 1970

The daily operating schedule was rotated in order to assess diurnal effects.

The receiving systems were calibrated as often as necessary to ensure that the signal strength data were accurate to the tolerance of the measuring equipment. Accuracies of about one dB are typical except at signal strengths near the receiver thresholds. The signal strength itself was not used as a variable. Its median value, however, was logged (Appendix D) and used to determine the sufficiency of fade margin to ensure the validity of the depth of fade and signal amplitude distributions.

Except as noted in the data and test logs the power output of the X-band transmitter was 1000 watts peak with a duty cycle of 0.2 on the wide band tests and the C-band tests used 500 watts and the same duty cycle. The special narrow bandwidth tests were using FM at 1000 watts for X-band and 500 watts for C-band.

Once each week the magnetic tapes were mailed from the operating site to the Orlando facility for processing through the data reduction facility. The actual data processing is described in the following section of this volume.

V. DATA PROCESSING

A. INTERMEDIATE PROCESSING

Signal strength data for the correlation bandwidth study was recorded on ten channels of an analog tape at 0.6 ips as previously described. A strip chart recording of either X- or C-band data was also made. A list of tests with corresponding information about bandwidth, AGC calibrations, weather, and special test conditions was kept in the test log.

When the recorded tapes were received at the Martin Marietta plant, they were processed by MADRE, Martin Automatic Data Reduction Equipment. MADRE processed the tape separately for X- and C-band signals. Each time five channels were digitized and recorded along with a time channel on an intermediate tape (see Figure 57). A Brush strip chart recording of the five data channels and a time marker corresponding to the time channel on the intermediate tape also was made. C-band data recorded on channels 1, 3, 5, 7, and 9 was played back at a 50:1 speed up. X-band data from channels 2, 4, 6, 8, and 12 was digitized at a speed up of 25:1. The lower speed up was necessary to ensure adequate sampling of the higher fade rates at X-band. MADRE's sample rate of 20,000 samples per second resulted in a sampling of each X-band channel every 1/160 second of actual test time and each C-band channel every 1/80 second of real test time.

After the digitizing was completed, the Brush charts, strip charts made at the receiver site, and test logs were used to select parts of the tests where all channels were operating correctly and which were not affected by aircraft. Some samples were chosen specifically to include aircraft fading so its effect could be studied separately. From acceptable tests, a segment of 6 MADRE-time seconds was selected to be reduced by the computer program. For C-band with a 50:1 speed-up 6 MADRE seconds equals five minutes of field testing. On X-band with a 25:1 speed-up the 6 MADRE seconds represented two and a half minutes of field testing. The selected parts of tests were reformatted and recorded on a tape suitable for CDC 6400 computer input (see Figure 58).

Information obtained from the test log was prepared for the computer data reduction. A preliminary program was used on the CDC 6400 digital computer to process the AGC calibrations (Figure 59). Punched cards describing the AGC calibration curves were the output from this program. For each test an identity card was manually punched for both X- and C-band.

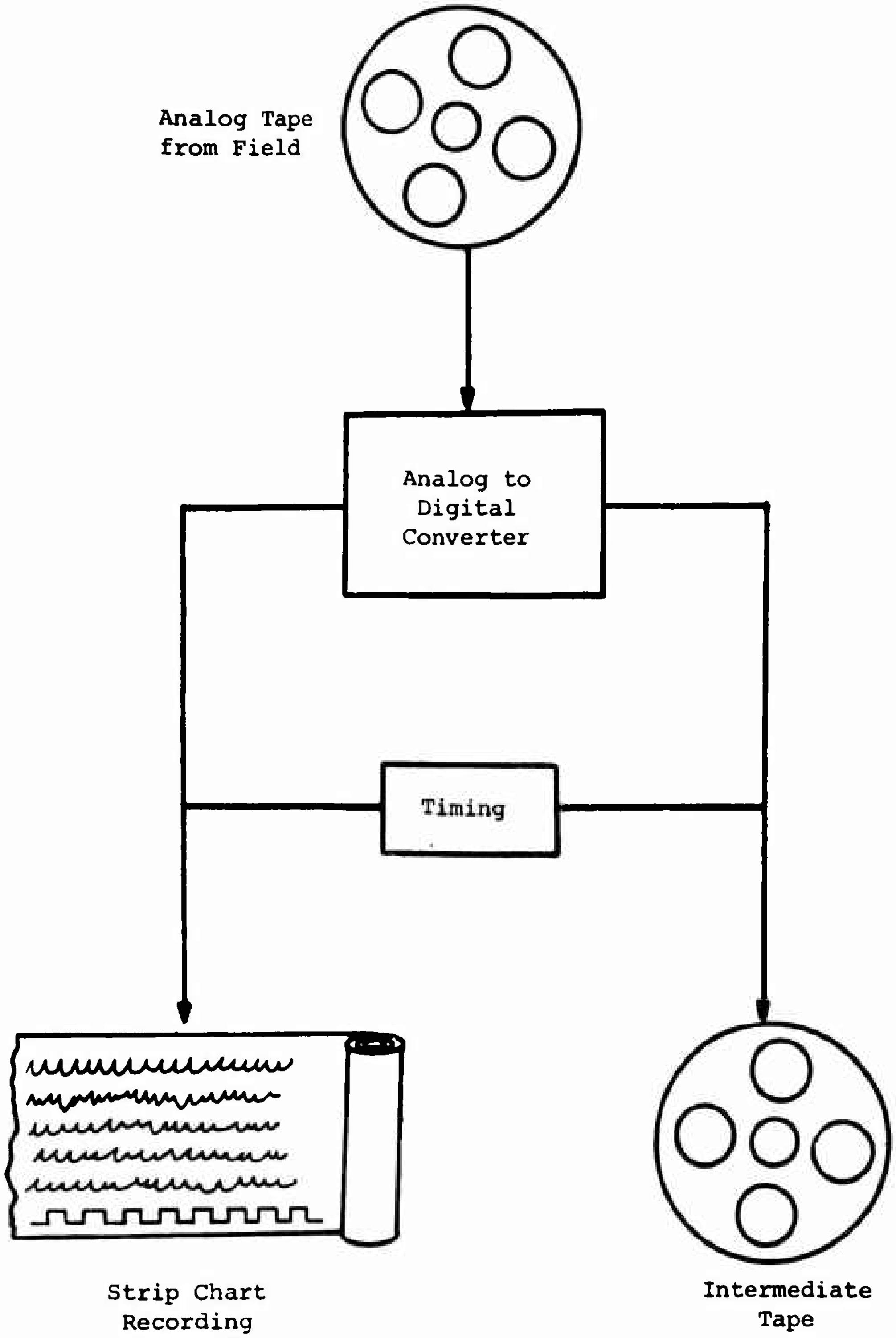


Figure 57. Analog to Digital Conversion

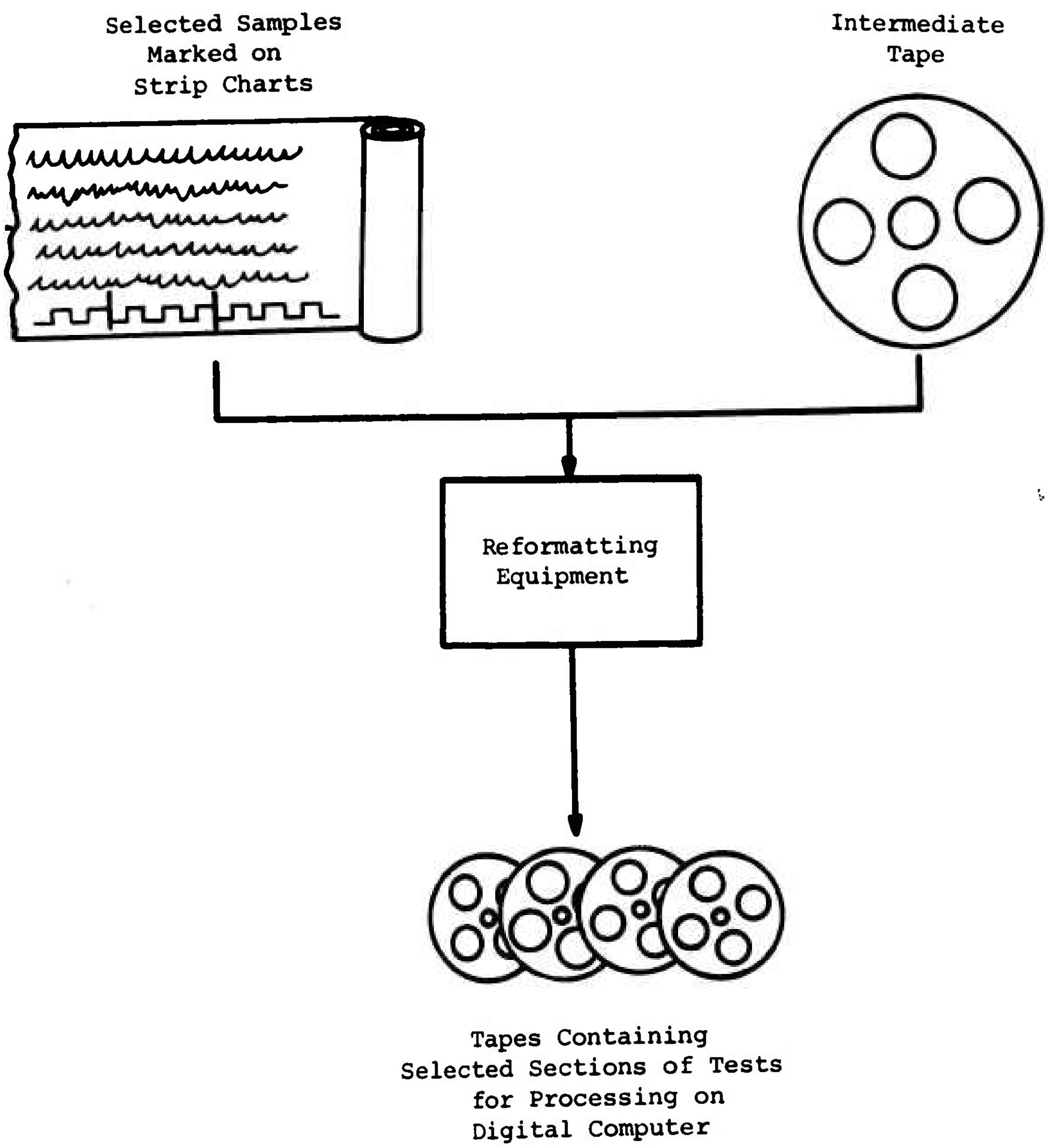


Figure 58. Final Digital Formatting of Selected Samples

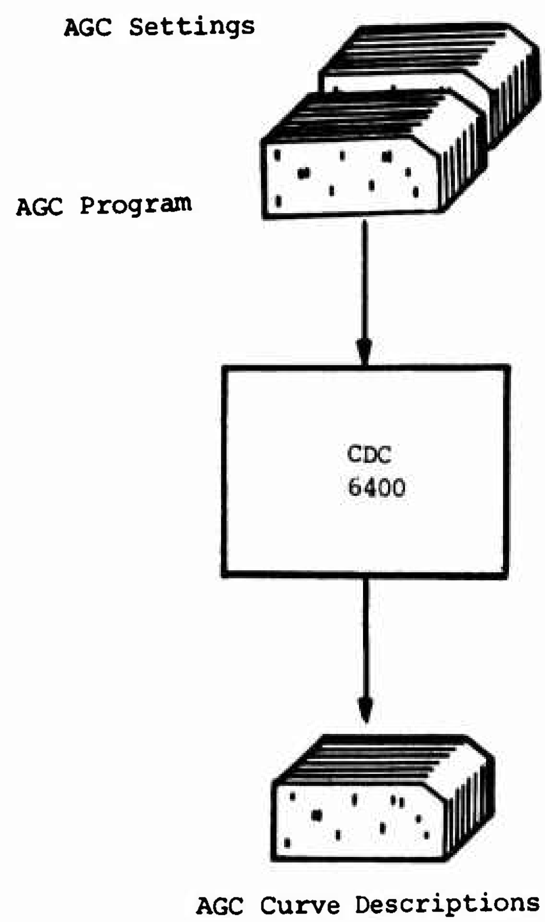


Figure 59. Intermediate Processing of AGC Curves

This card contained information about the test including date, time, test number, frequency, bandwidth, receive site weather and temperature, transmit site weather and temperature, and AGC curve identification. The test identification word was used on all the printed and punched data for the test. A typical test identification can be interpreted as follows:

02 17 1320 09 W C 21 16 05 16

16	Transmit Site Temperature Code
05	Transmit Site Weather Code
16	Receive Site Temperature Code
21	Receive Site Weather Code
C	C-Band
W	Wide Frequency Spacing
09	Ninth Test of the Day
1320	Test Started at 1320
17	Day
02	Month

The test identification cards and AGC curve cards were input data to the computer program used to read the tapes prepared by MADRE.

B. DATA REDUCTION

After MADRE completed reformatting the data onto tapes for the CDC 6400, the tapes were read by a program entitled SPEED. The input-output and some arithmetic statements of the program are written in FORTRAN, but most of the calculations are controlled by subroutines written in COMPASS, a CDC machine language.

A separate run of SPEED was made for each reformatted tape as in Figure 60. In addition to the tape input, test identifications and AGC curves corresponding to the tests on the tape were input in card form. The program read the tape in blocks of 2000 samples and calculated the correlation coefficients, median signal strength, and mean signal strength. Nine correlation coefficients were calculated for wide spaced tests since nine different frequency spacings were obtained by selected frequency separations.

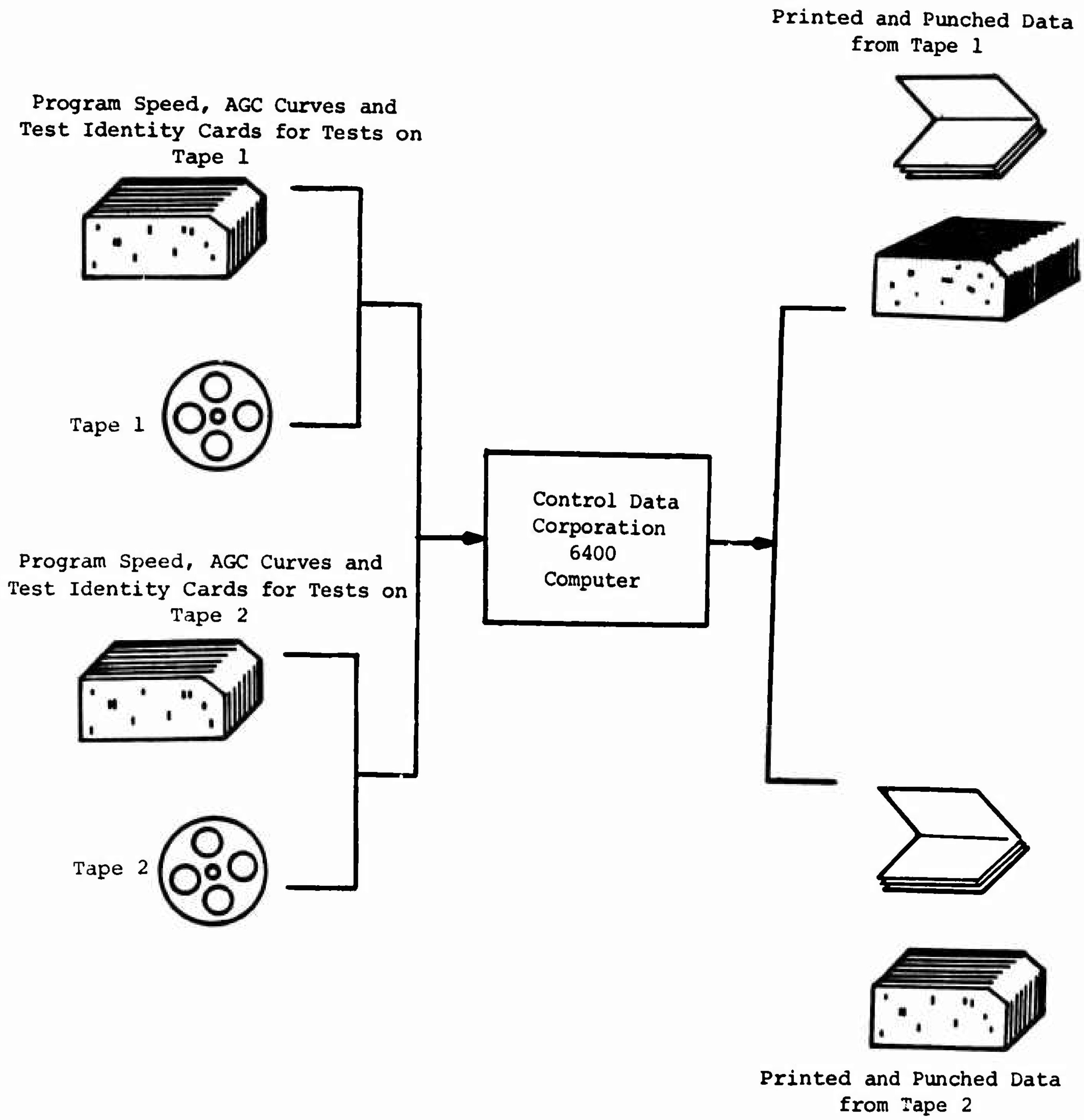


Figure 60. Tape and Card Input Data Processing by Main Data Reduction Program

Wide	F1	F2			F3			F4		F5	
Spacing	0	1	2	3	4	5	6	7	8	9	MHz

For narrow spaced tests, only four correlation coefficients were calculated since the five channels were uniformly spaced. Further combinations of the channels would have given only duplicate frequency separations between the correlated channels.

Narrow	F1		F2		F3		F4		F5	
Spacing	0	100	200	300	400	500	600	700	800	kHz

The decision to calculate nine or four correlation coefficients was made by the program based on the letter W for wide or N for narrow in the test identity.

Fade rate, fade depth, fade duration, and signal amplitude distribution calculations were made for only one channel, F3. For each test, all these data were outputted by both the printer and the card puncher. In addition to calculated data, each punched card contained the test identification for the test and a code punch in columns 79 and 80 to identify the type of data on the card. The printed outputs from the program runs were used to determine whether the data was processed correctly and to check characteristics of individual tests.

C. PLOTTING

Plots of the data for some tests were made either separately or with a number of tests grouped on the same axis. All plot programs were first run on the CDC 6400 from which a magnetic tape was made for use on the CALCOMP 763 off-line plotter and CALCOMP 770 console combination (see Figure 61).

When all the data tapes for a testing period at a site had been read by SPEED, the data was machine sorted by the codes representing frequency, date and type of data desired (Figure 62). Prior to final collation of the data for a testing period, the printouts for all the tests were manually checked. Tests for which the median signal strengths were not at least 20 dB above noise were considered to have insufficient fade margin to be considered in the fade depth, fade duration, and signal amplitude summaries. Fade rate, however, considers only positive crossing of the median, thus insufficient fade margin had no adverse effects on the fade rates observed. A list of all tests from which samples were selected was prepared by the computer. This test list included the test number, receiver location, weather conditions at both sites, and the median signal strength during the test.

Distribution plots were made to display the data obtained during each period of testing at the various sites. Five kinds of data were

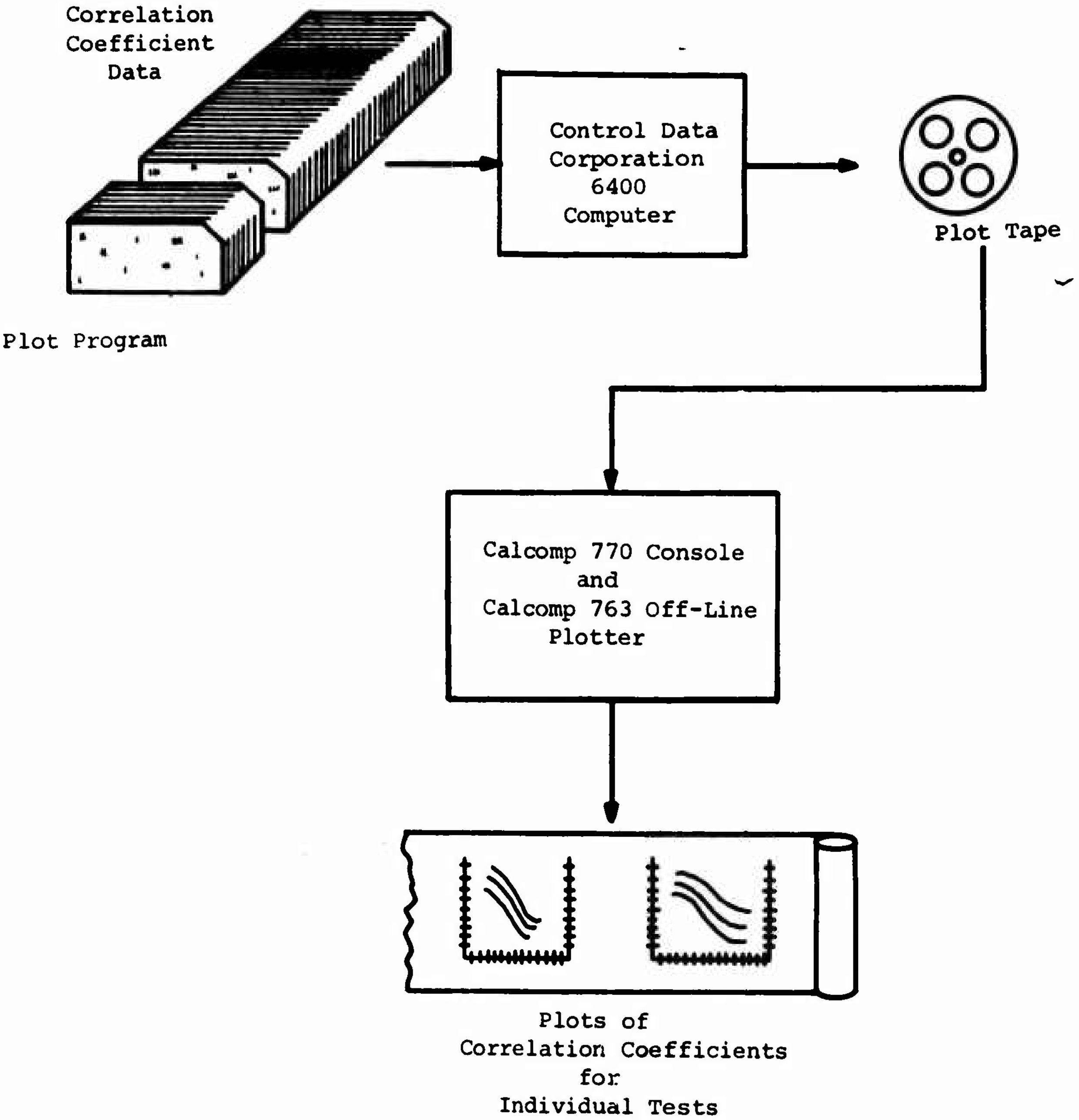


Figure 61. Plotting of Correlation Coefficient Data for Individual Tests

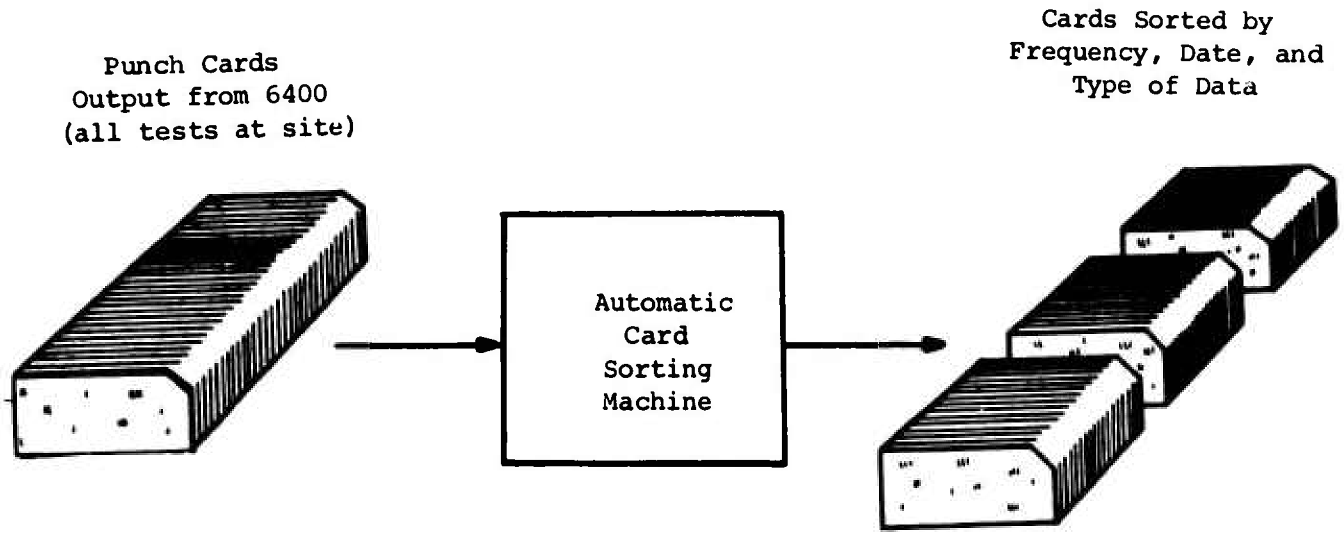


Figure 62. Automatic Data Sorting

plotted for both X-and C-band. These were correlation coefficient, fade rate, fade depth, fade duration, and signal amplitude. Diurnal effects were considered by making distribution plots for the data of tests started during four time classes: 0001 to 0600, 0601 to 1200, 1201 to 1800, and 1801 to 2400 hours. Separate distribution plots were also made for the data of all tests run when the receiver site temperature was greater than an estimated average temperature for the period of testing and when the temperature was less than or equal to the average temperature. In addition, a distribution plot designated ALL was made for the data of all tests performed during the test period without regard to time of day or temperature.

Sets of percentile distributions were made for correlation coefficient, fade rate, fade depth, and signal amplitude data. If ten or more tests were included in the distribution, the upper decile, median, and lower decile were plotted. If fewer than three tests were available for a distribution, no plot was made. For distributions including three to nine tests, only the median was plotted.

In order to summarize fade duration data, a cumulative array of fade durations for each of five levels from 0 to 20 dB below the median was made. The cumulative percentage by fade duration class was then calculated at each level and plotted.

Summary bar graphs were made to permit an easy comparison of the data obtained during different periods of testing at a site. Separate graphs were made to X-and C-band data from all four sites. The information contained in the summary bar graph was read from decile distribution plots. For the correlation coefficient data, the value of the frequency separation of the median and upper and lower deciles for which the correlation coefficient, ρ_e, equals 0.4 on the distribution plot was plotted in the corresponding location on the bar chart. For the fade rate and fade depth data, the value in Hertz or dBm below the median where the median and upper and lower decile crossed 50 percent, was transferred to the bar graph. In the signal amplitude distributions, the value exceeded 95 percent of the time was plotted on the summary bar graph. In cases where fewer than ten tests were included in the distribution, only the median was read from the plot. The fade duration summary bar graph was done in a similar manner but values were read for 0, 10, and 20 dB below the median.

VI. REDUCED DATA

In this section distribution and summary plots of data taken during eight different test periods at the four sites are shown. Correlation coefficient, fade rate, fade depth, fade duration, and signal amplitude plots are included.

A. FREQUENCY CROSS-CORRELATION MEASUREMENTS

1. Individual Tests and Narrow Spacing Tests

The results of individual tests made simultaneously at X- and C-bands are of significant interest. The study indicates that: 1) Correlation bandwidth is a rather rapidly changing function of time. 2) There is no significant loss of frequency diversity expected as a result of employing X-band as compared to C-band over these paths and with these antenna sizes. 3) The correlation bandwidth shows some relation with fade rate, but not always the same trend is displayed. 4) For the narrow spacing tests the derivative of the cross-correlation coefficient versus frequency separation is zero as the frequency separation approaches zero.

The data from individual tests are plotted in Figures 63 through 79. A number of individual tests are plotted on the same axis to permit a comparison of results from one test to the next. The test numbers indicated on the curves are the individual test identification numbers which can be interpreted as follows:

09 25 1118 06

- 06 — Sixth Test of the Day
- 1118 — Test Started at 1118
- 25 — The Twenty Fifth Day of the Month
- 09 — The Ninth Month

Figures 63 and 64 represent a set of simultaneous measurements of correlation versus frequency separation taken at C- and X-bands. It is immediately apparent that we are dealing with a rapidly changing phenomenon since from one test to another no two curves coincide. Moreover, the marked break between 1050 and 1115 hours suggests that the scattering mechanism went through a complete and abrupt change in its characteristics.

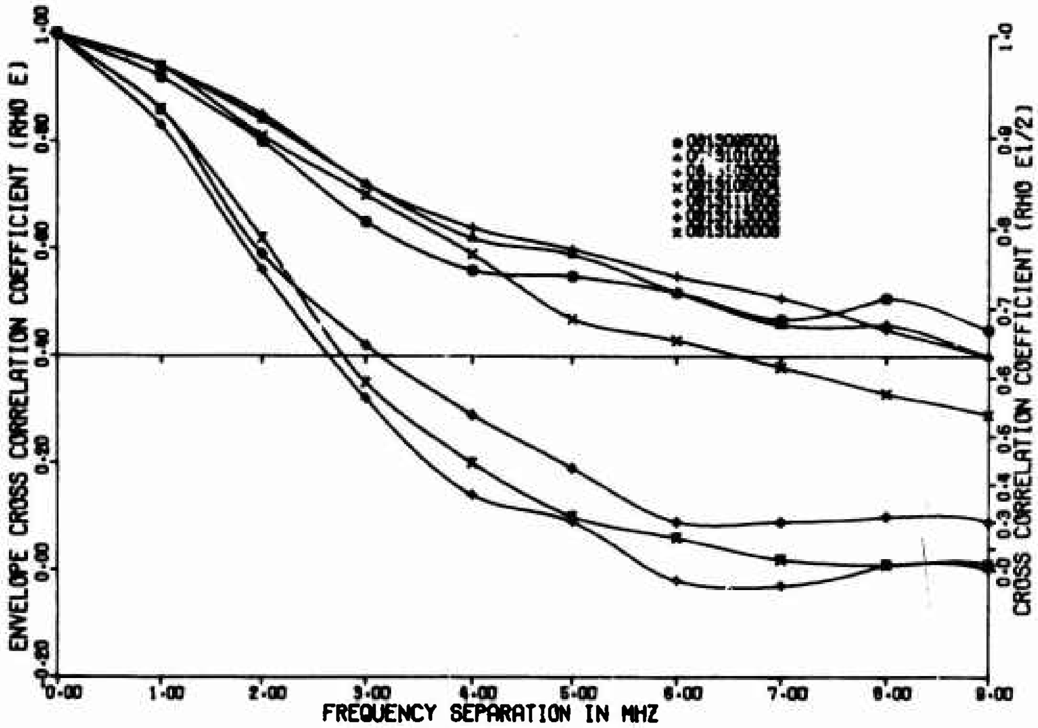
In Figure 64, the same type of phenomena is present at X-band and apparently occurred during the same time interval. Another item of importance to note is that the correlation bandwidths test by test are approximately equal for both X- and C-bands. This observation was generally true for all measurements taken at all the overland receiving sites. Point Petre, the over-water site, is somewhat different, but the trend (as will be shown later) is present.

Figures 65 and 66 are representative of the data obtained at Whitford Field and were taken simultaneously at C- and X-bands. Marked breaks in the curves did not occur in this path which is a great deal longer than the Ontario Center path. The correlation bandwidth is about the same for either frequency.

Point Petre, the overwater path, sometimes deviates completely from what might be expected in that Figure 67 shows the C-band data wider than the X-band data (Figure 68) in two of the three simultaneous tests. Further, a study of the Point Petre data for other days (Figures 69 through 72) show essentially the trend of the same correlation bandwidth for each frequency band with the slightly wider bandwidths at X-band.

Correlation bandwidth appears to be related to fade rates at times, although this is not always true. For example, in Figures 73 and 74, it can be seen that the correlation bandwidth test that has the highest fade rate (A) has the lowest bandwidth while the test resulting in the lowest fade rate (B) has the widest bandwidth. This trend was true more often than not, but there were many exceptions as illustrated in Figures 75 and 76 in which approximately the reverse is observed. Figure 77 is an interesting adjunct to Figure 63 for studying the simultaneous fade rates versus the marked discontinuity in correlation bandwidth. It is noted that the fade rates were, in general, dropping as indicated by tests....1, 2, 3, and 4. Between tests 4 and 5 the correlation bandwidth reduced to about half its previous value and the fade rates increased for one test and then dropped as indicated by tests ....5, 6, and 8. This observation at least suggests that something had changed within the common volume and adds credence to the proposal that the atmosphere in the common volume had changed from relatively stable to unstable.

The tests using 200 kHz spacing (Figures 78 and 79) indicate quite conclusively that the derivative of the correlation coefficient at zero frequency spacing is indeed zero. These curves are typical of many tests, all of which yielded essentially the same results. This determination is important to the prediction of irreducible error rates in frequency diversity troposcatter systems which according to Reference 21 results in many orders of magnitude difference in predicted performance.

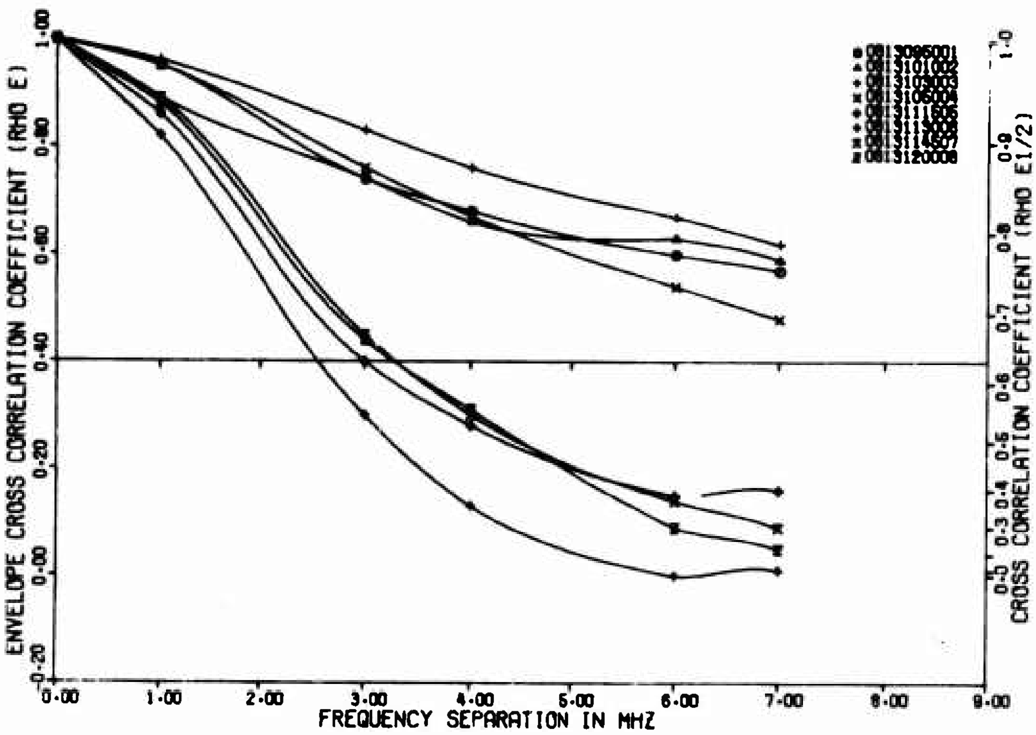


ENVELOPE CROSS CORRELATION COEFFICIENTS

ONTARIO CENTER, SUMMER

C-BAND,WIDE

Figure 63.



ENVELOPE CROSS CORRELATION COEFFICIENTS

ONTARIO CENTER, SUMMER

X-BAND,WIDE

Figure 64.

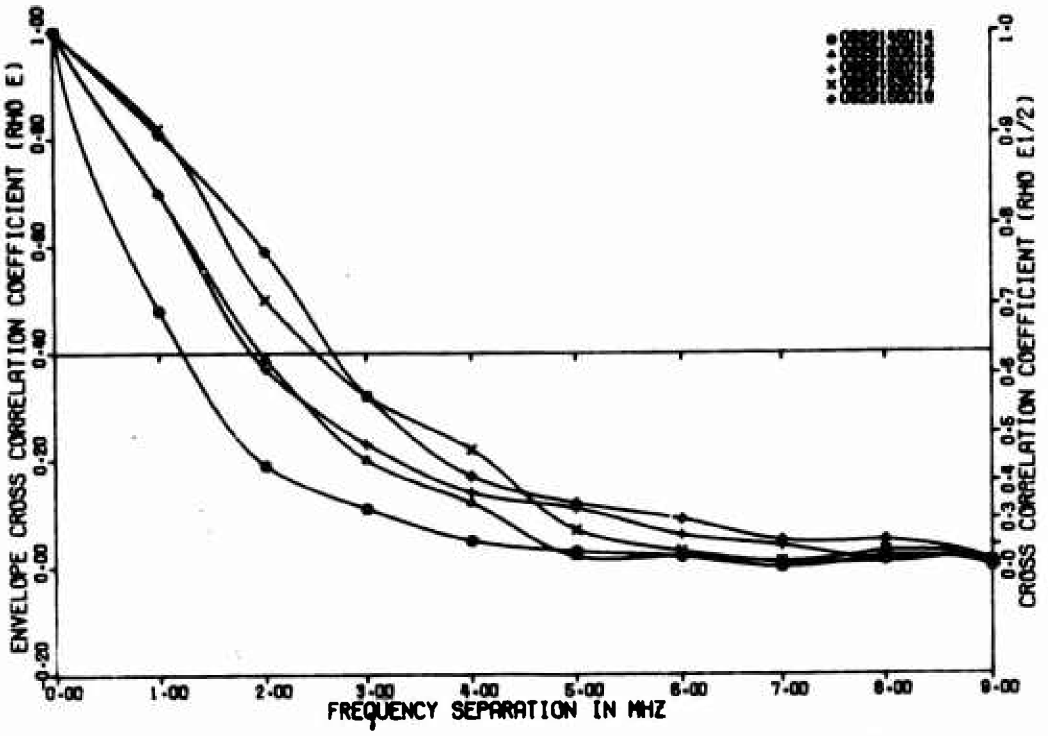


Figure 65. ENVELOPE CROSS CORRELATION COEFFICIENTS
WHITFORD FIELD, SUMMER
C-BAND,WIDE

Figure 65.

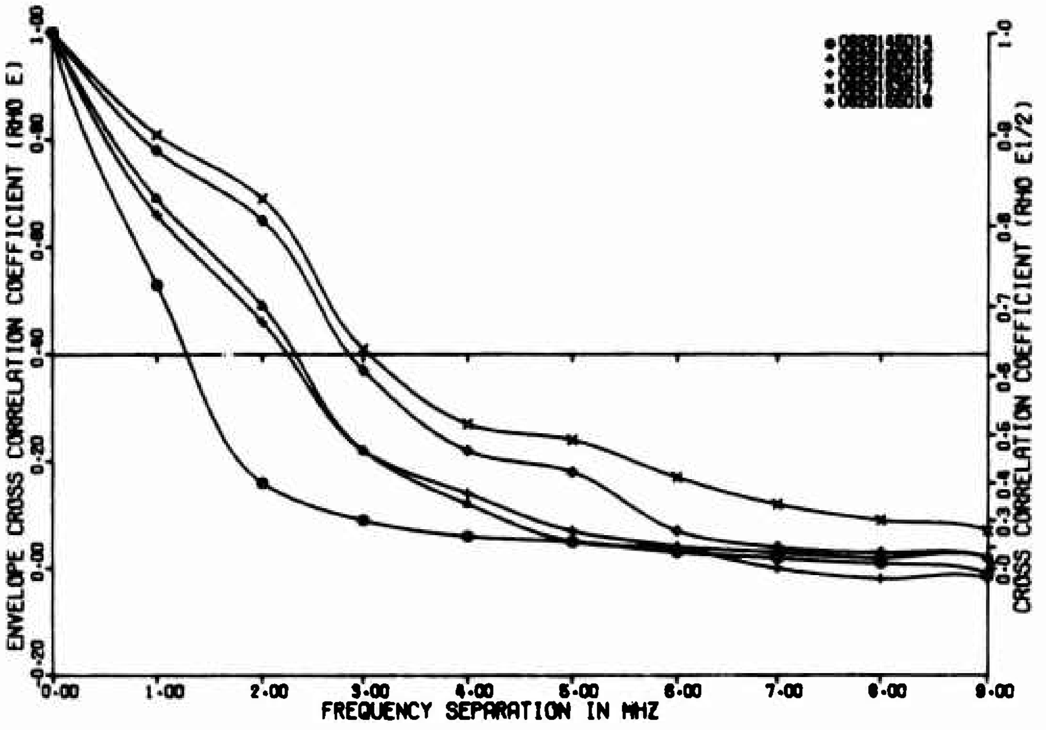
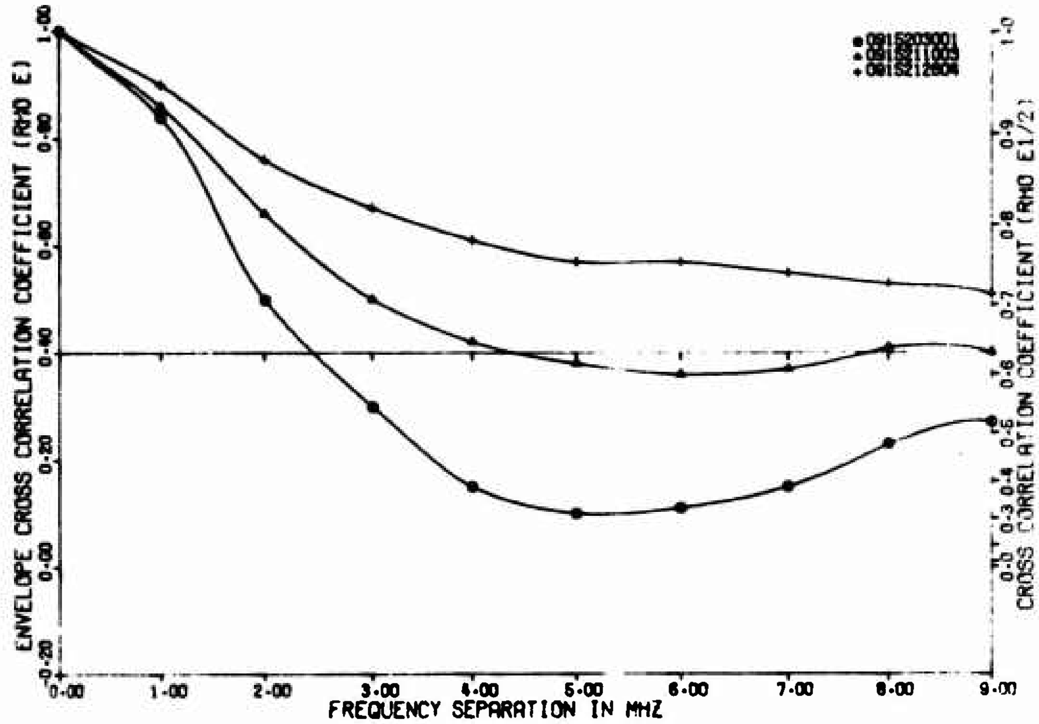


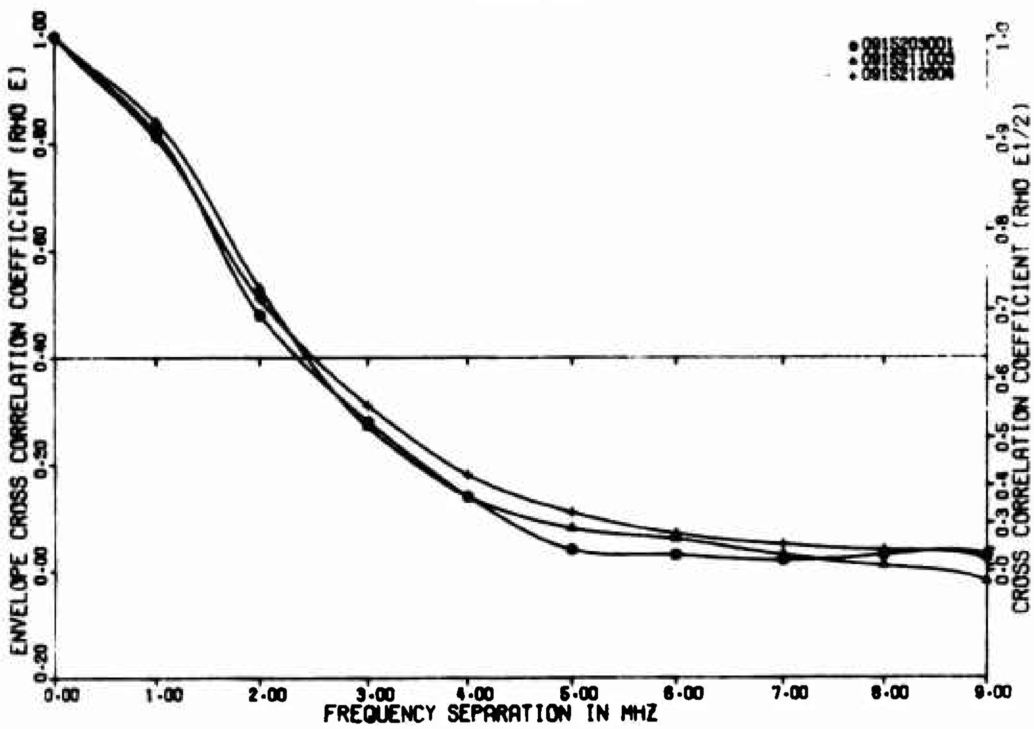
Figure 66. ENVELOPE CROSS CORRELATION COEFFICIENTS
WHITFORD FIELD, SUMMER
X-BAND,WIDE

Figure 66.



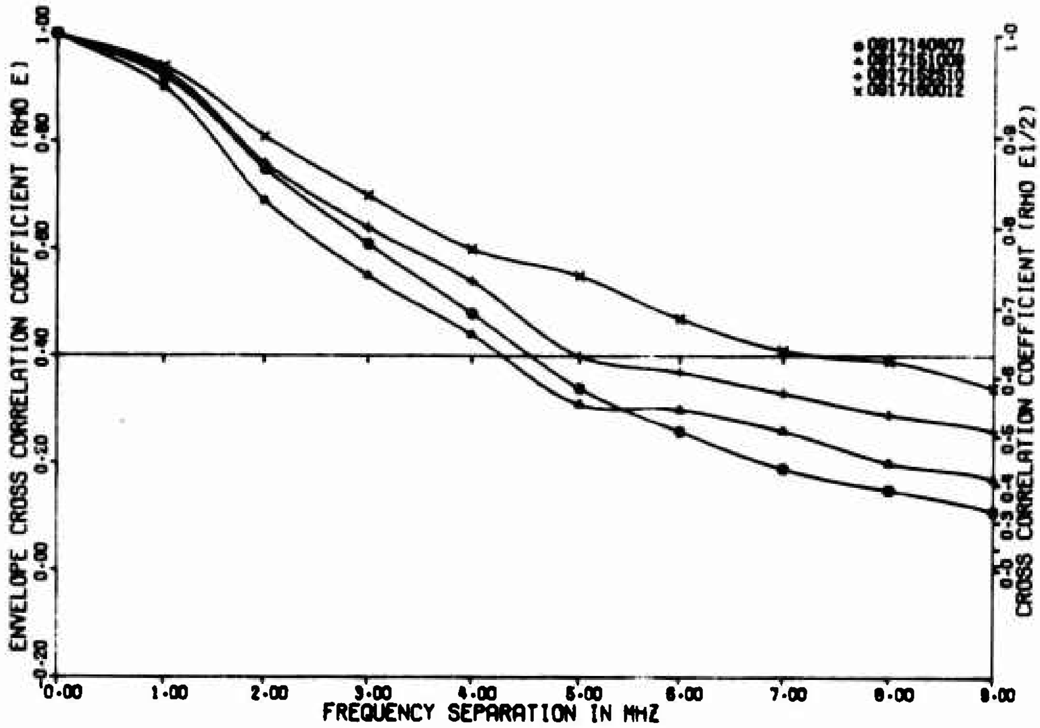
ENVELOPE CROSS CORRELATION COEFFICIENTS
POINT PETRE, SEPT
C-BAND,WIDE

Figure 67.



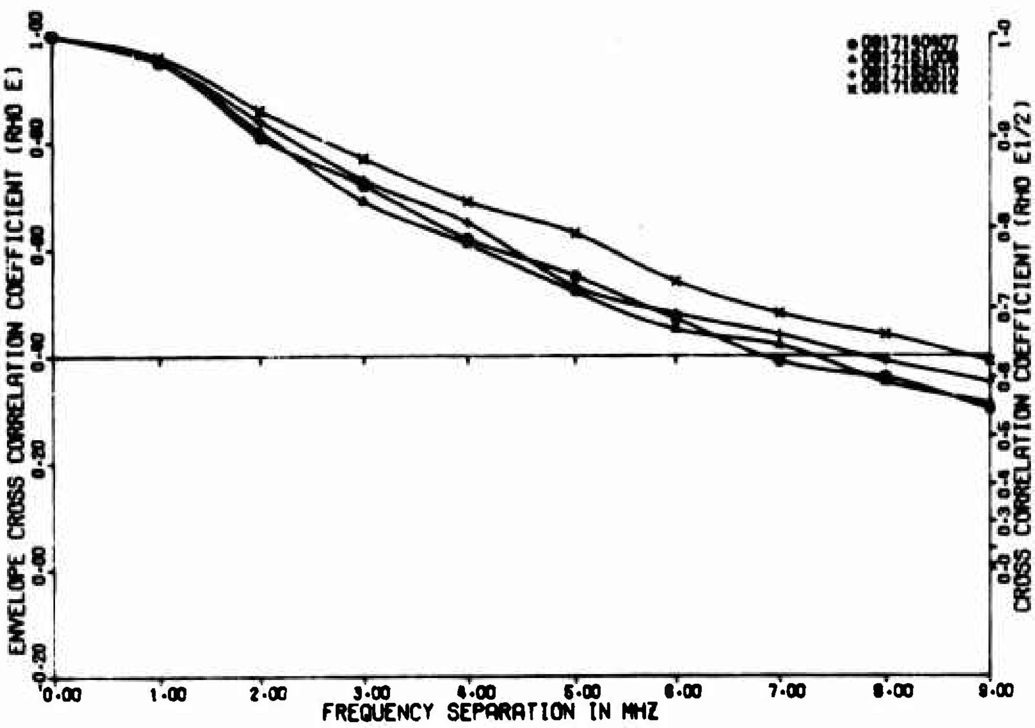
ENVELOPE CROSS CORRELATION COEFFICIENTS
POINT PETRE, SEPT
X-BAND,WIDE

Figure 68.



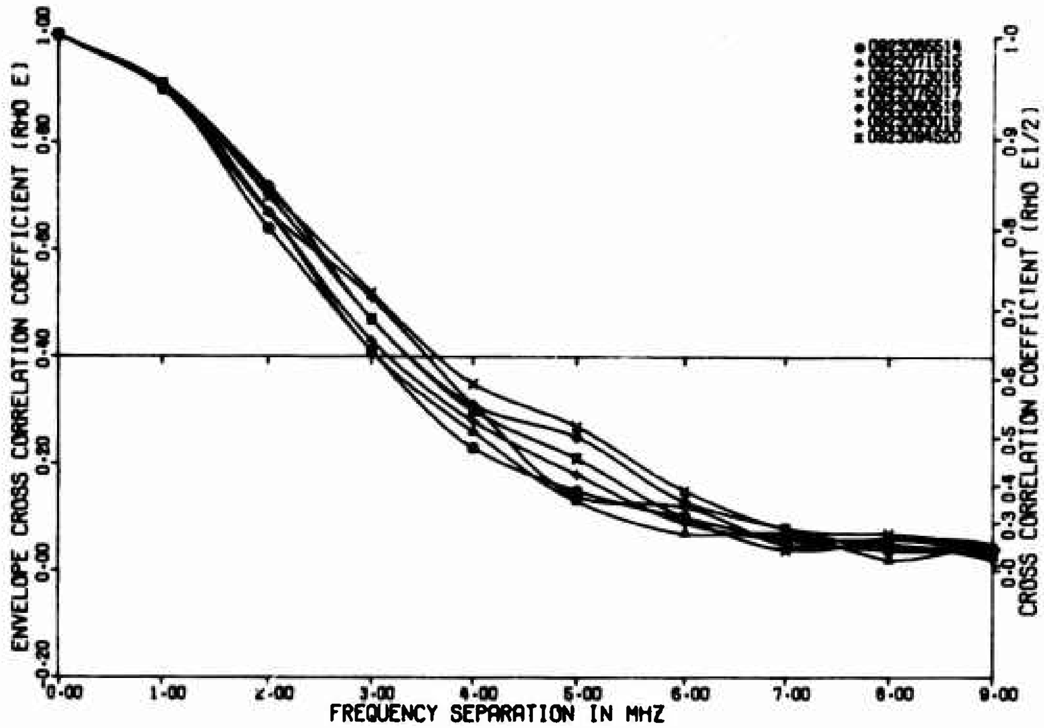
ENVELOPE CROSS CORRELATION COEFFICIENTS
POINT PETRE, SEPT
C-BAND,WIDE

Figure 69.



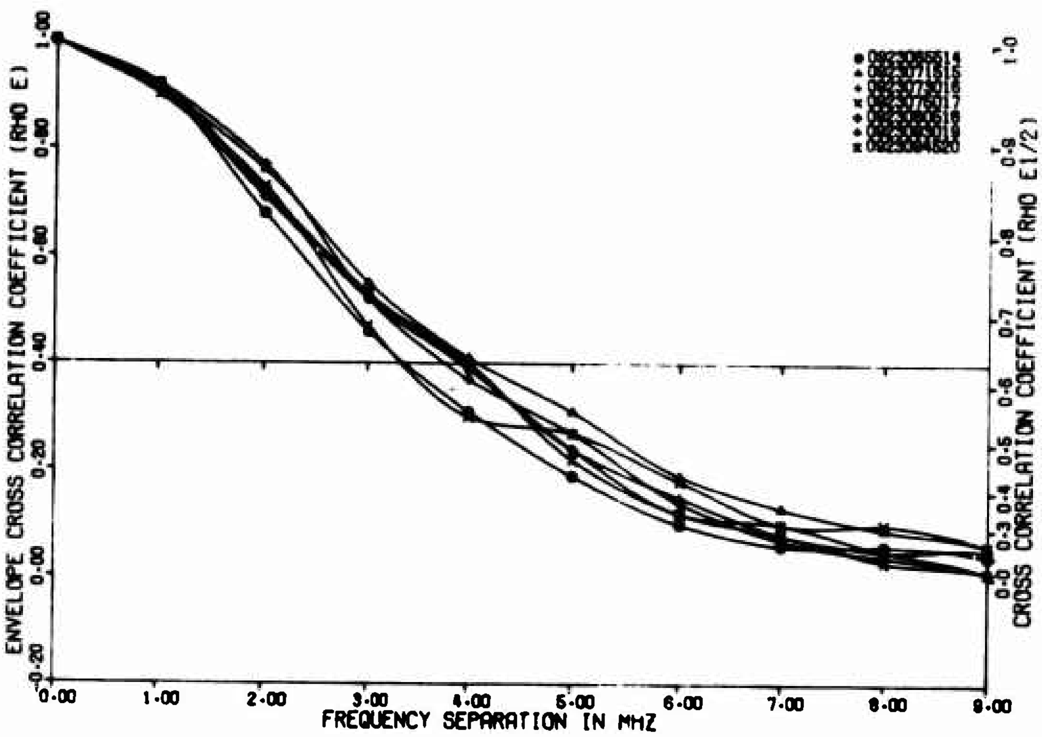
ENVELOPE CROSS CORRELATION COEFFICIENTS
POINT PETRE, SEPT
X-BAND,WIDE

Figure 70.



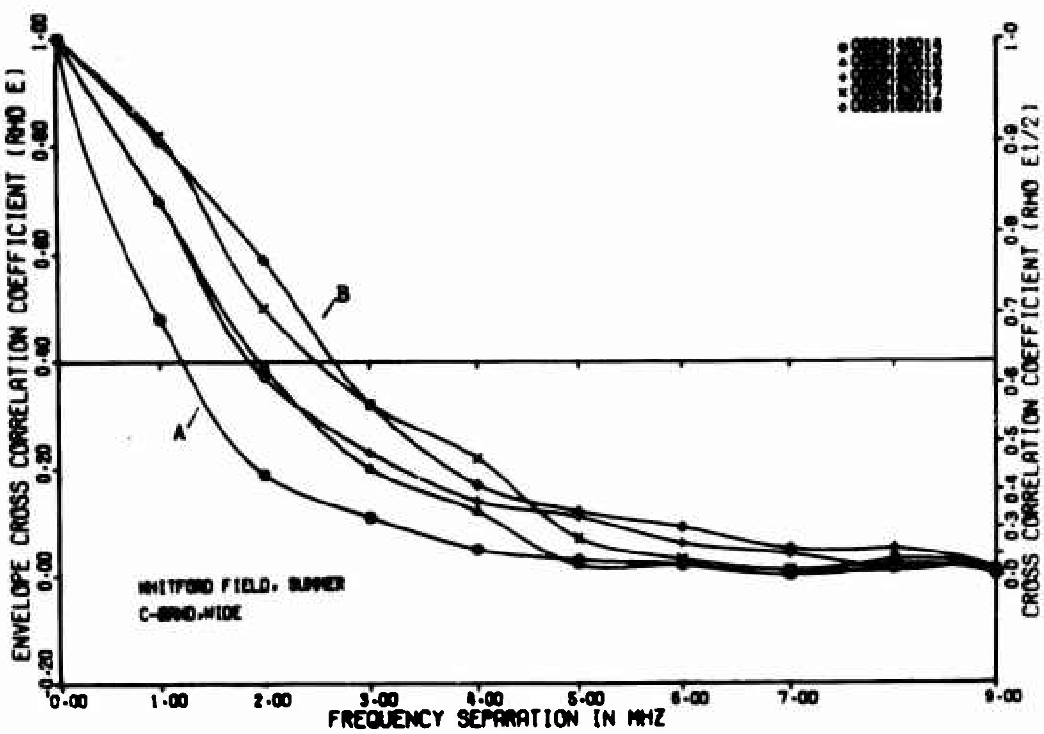
ENVELOPE CROSS CORRELATION COEFFICIENTS
POINT PETRE, SEPT
C-BAND:WIDE

Figure 71.



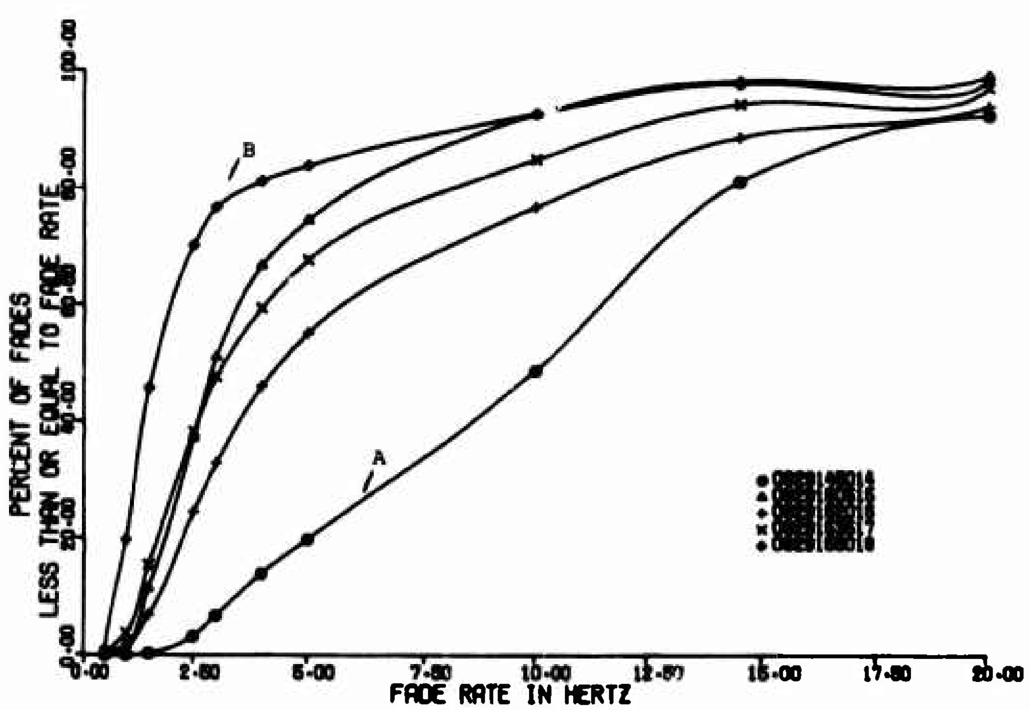
ENVELOPE CROSS CORRELATION COEFFICIENTS
POINT PETRE, SEPT
X-BAND:WIDE

Figure 72.



ENVELOPE CROSS CORRELATION COEFFICIENTS

Figure 73.

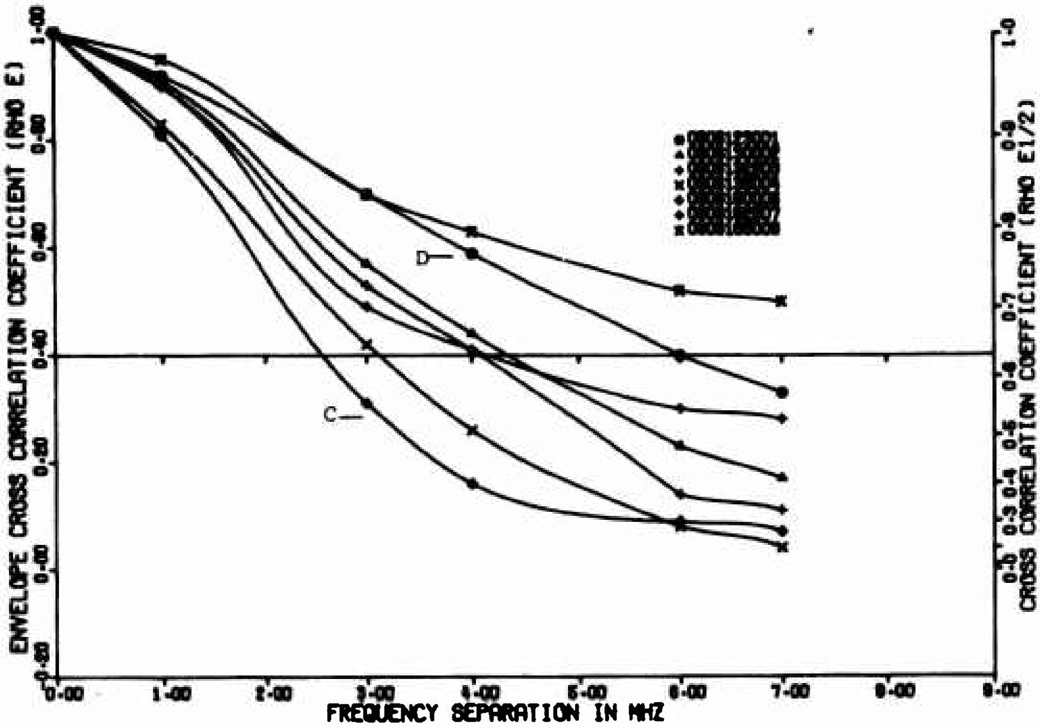


FADE RATE DISTRIBUTION

WHITFORD FIELD, SUMMER

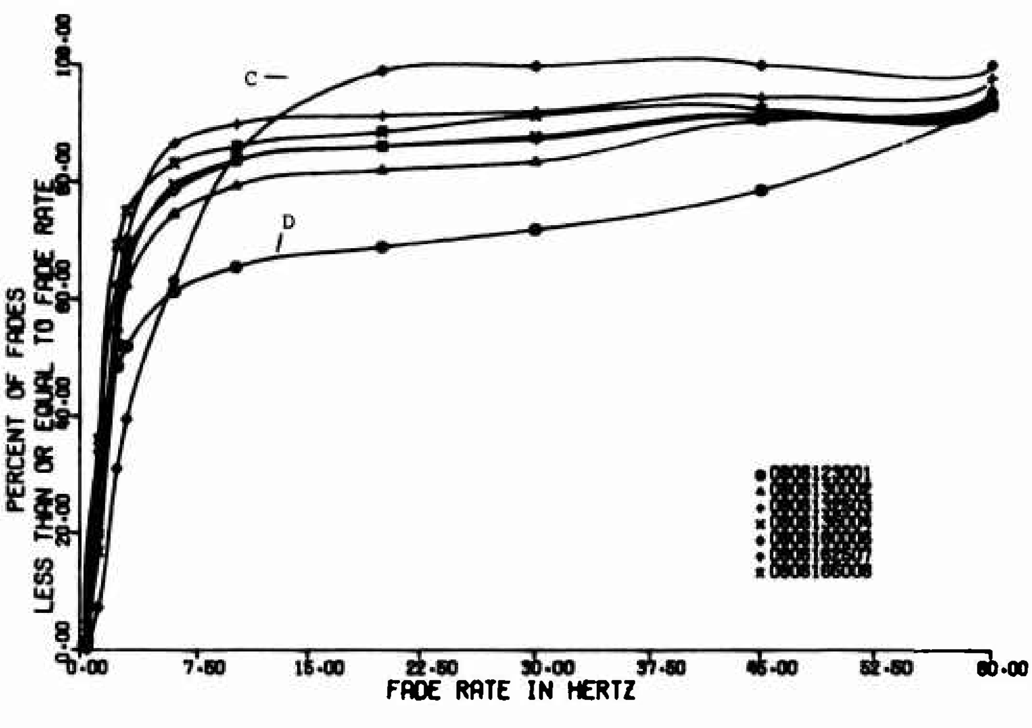
C-BAND

Figure 74.



ENVELOPE CROSS CORRELATION COEFFICIENTS
ONTARIO CENTER, SUMMER
X-BAND,WIDE

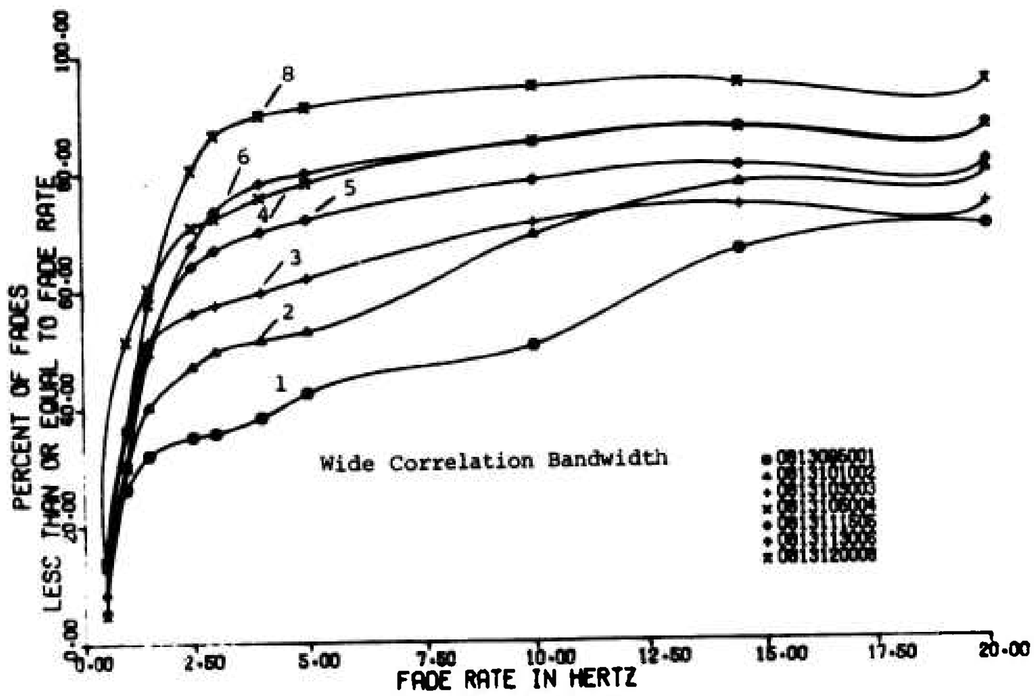
Figure 75.



FADE RATE DISTRIBUTION
ONTARIO CENTER, SUMMER
X-BAND

Figure 76.

Narrow Correlation Bandwidth



FADE RATE DISTRIBUTION
ONTARIO CENTER, SUMMER
C-BAND
Figure 77.

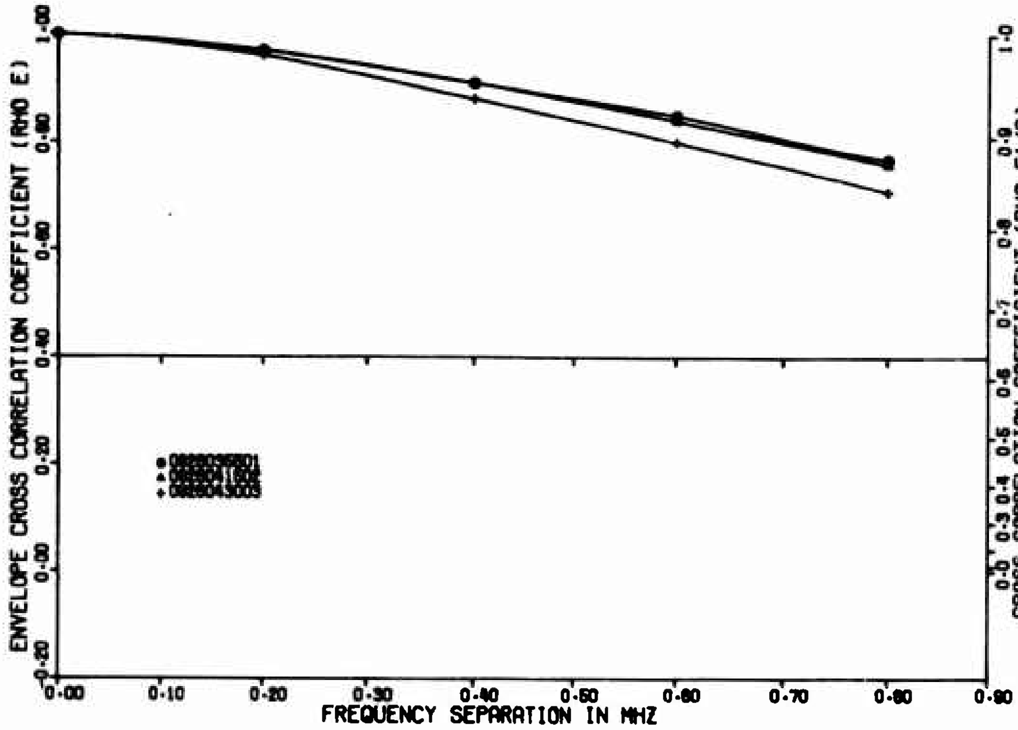


Figure 78. ENVELOPE CROSS CORRELATION COEFFICIENTS
POINT PETRE, SEPT
C-BAND, NARROW
Figure 78.

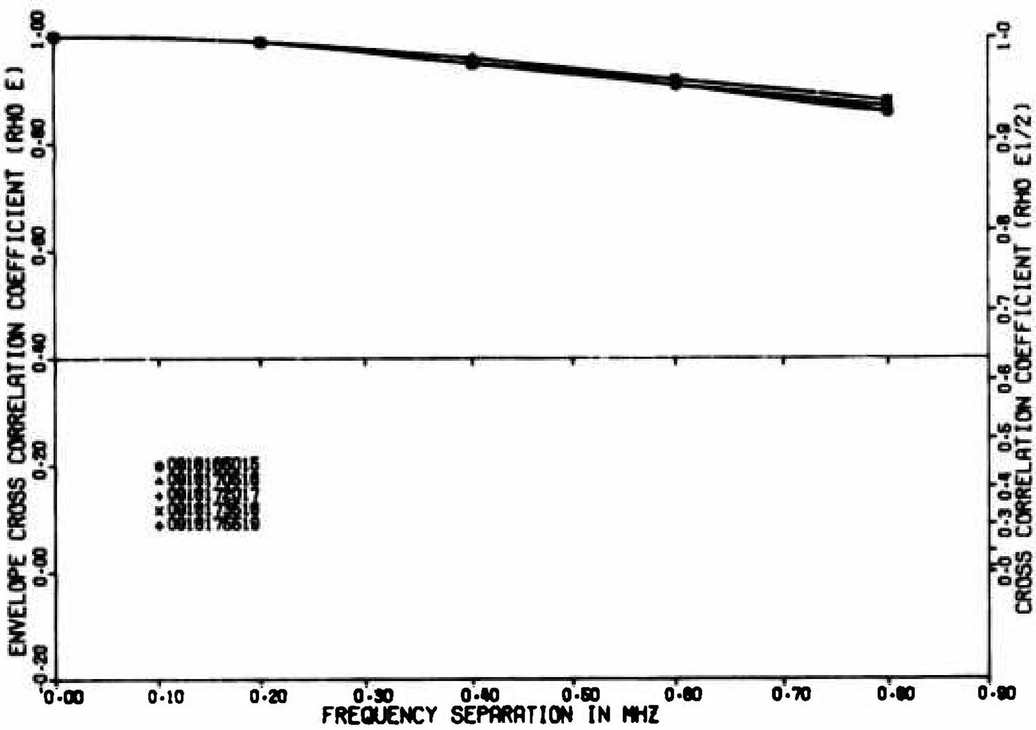


Figure 79. ENVELOPE CROSS CORRELATION COEFFICIENTS
POINT PETRE, SEPT
X-BAND, NARROW
Figure 79.

2. Overall Correlation Distributions

Overall correlation coefficient distributions are plotted in Figures 80 through 95. All the distribution plots for correlation coefficient data are included. Only wide spaced tests are used in these plots. Values of the envelope cross correlation coefficient are shown on the left axis. Corresponding values of the cross correlation coefficient, ρ, which is related to the envelope cross correlation coefficient, ρ_e, by:

$$\rho_e = \rho^2$$

are given on the right vertical axis.[21] The intersection of the curves with the horizontal line at $\rho_e = 0.4$ defines the correlation bandwidth. Both the upper and lower deciles as well as the median correlation for the tests included are shown. The number of tests in each distribution is also listed.

Because the actual antenna beamwidth was greater for C-band (1.5 degrees HPBW) than X-band (1.07 degrees HPBW) a wider correlation bandwidth would normally be expected for X-band. However, these figures illustrate the general finding that the frequency correlation did not vary markedly from one band to the other. In fact, for the Ontario Center summer data, the median correlation bandwidth was actually slightly larger at C-band.

An inverse dependence of median correlation bandwidth on scatter angle is apparent with the narrowest medians being measured for Port Byron and Whitford Field. However, no systeratic variation of the medians with time of year is evident in these plots.

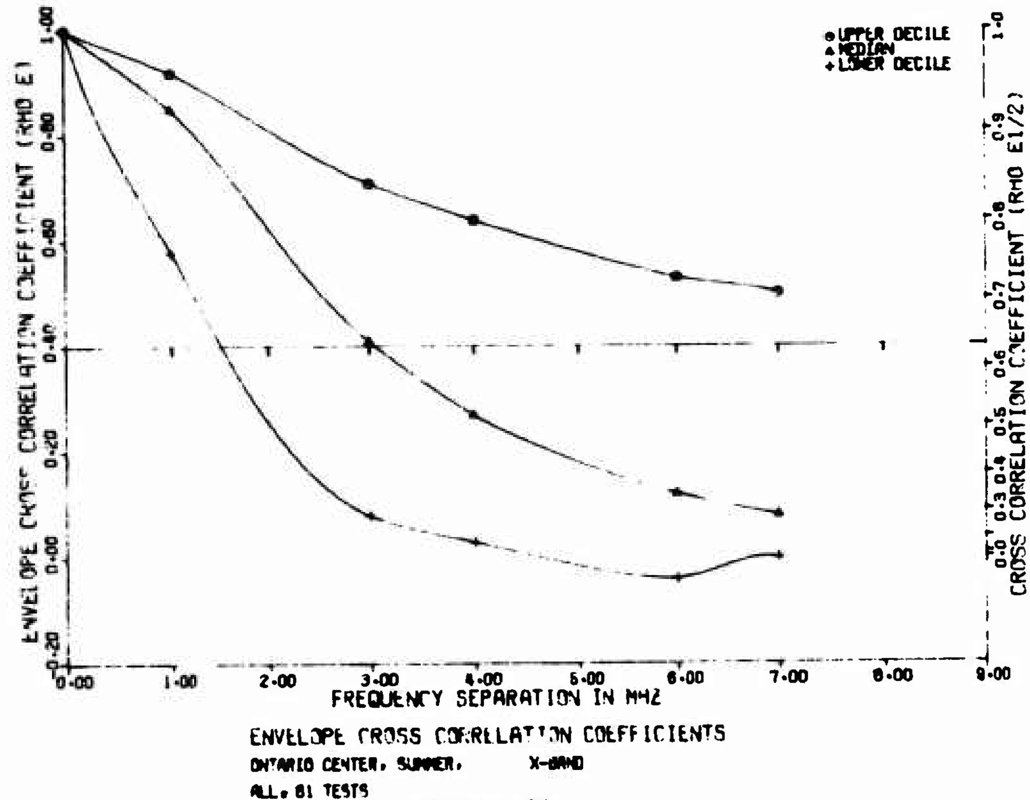


Figure 80.

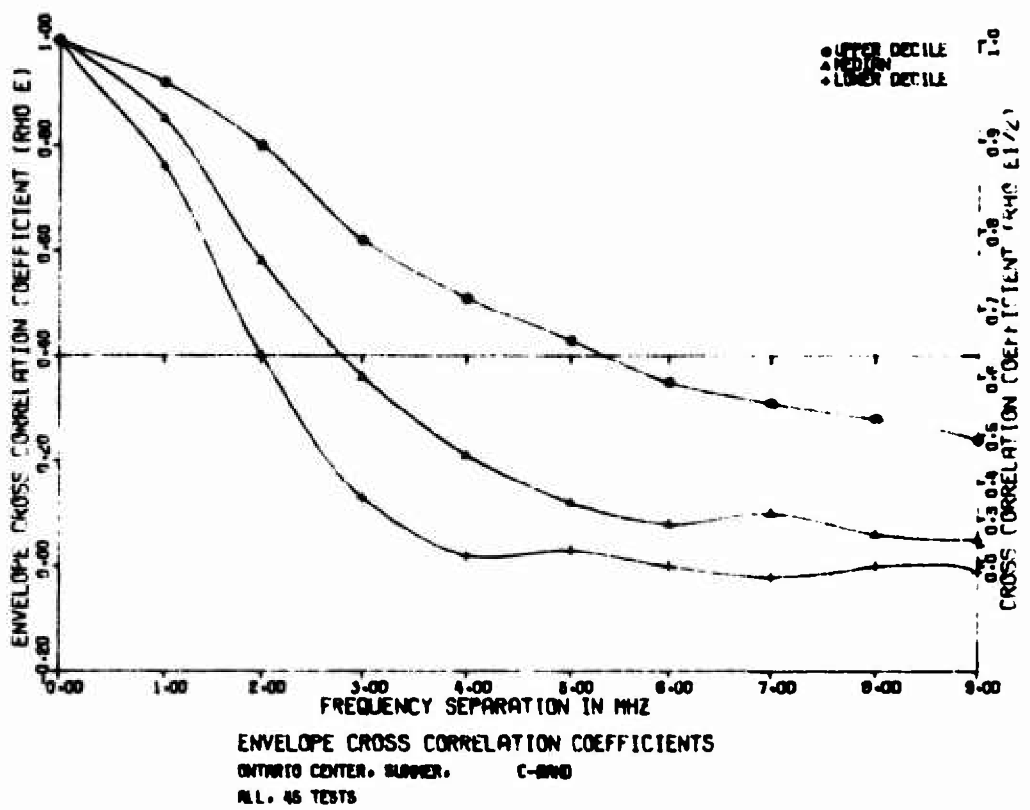
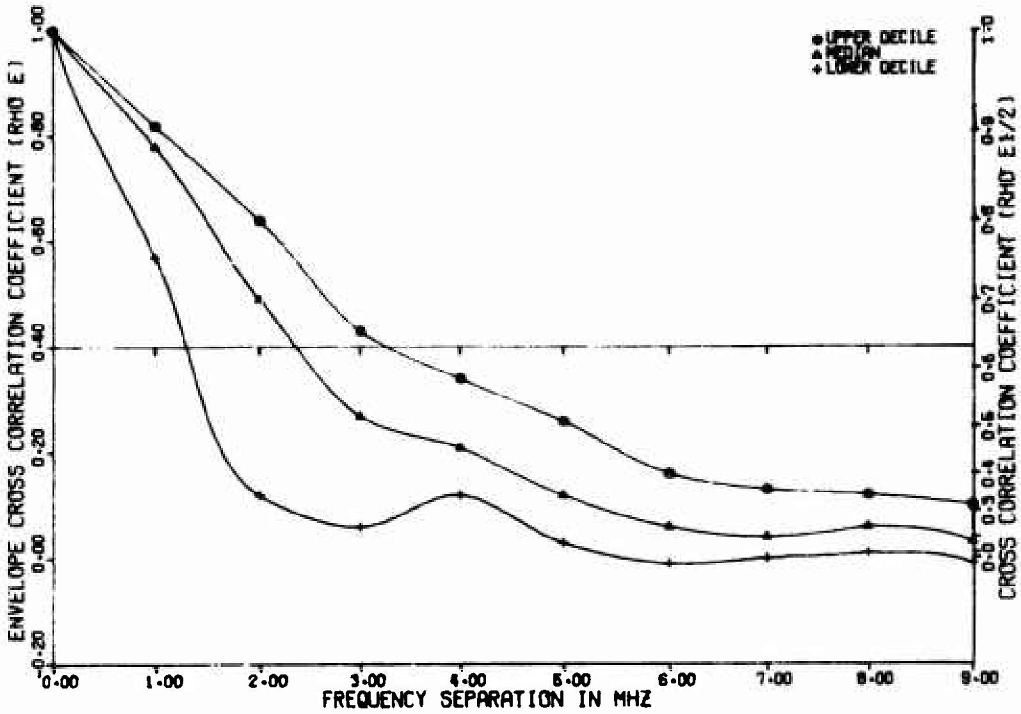
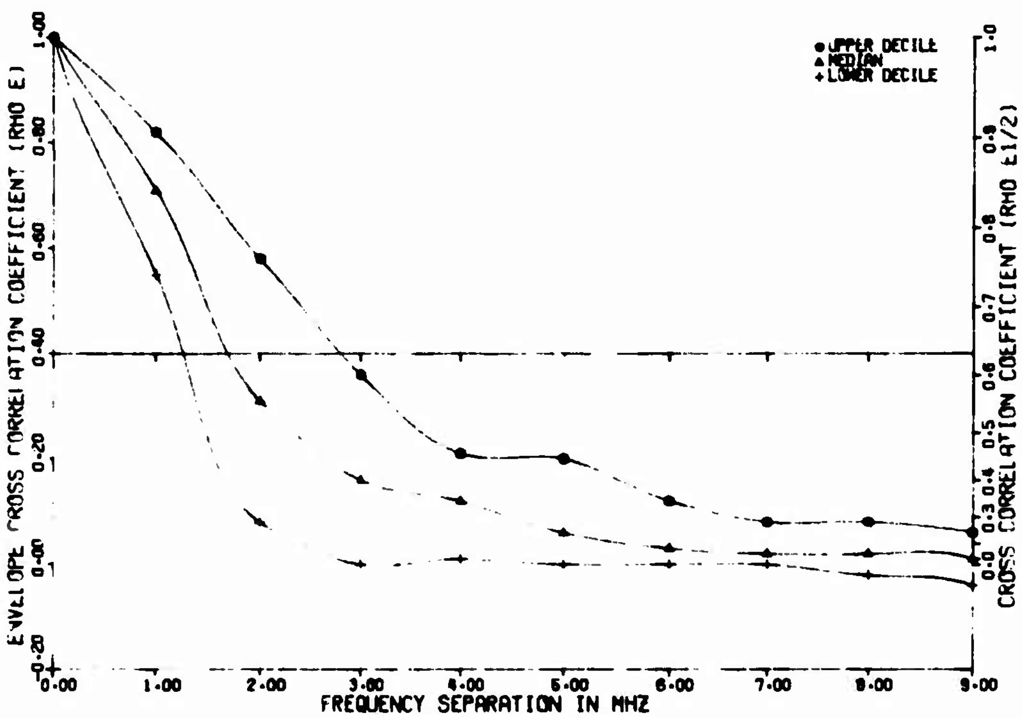


Figure 81.



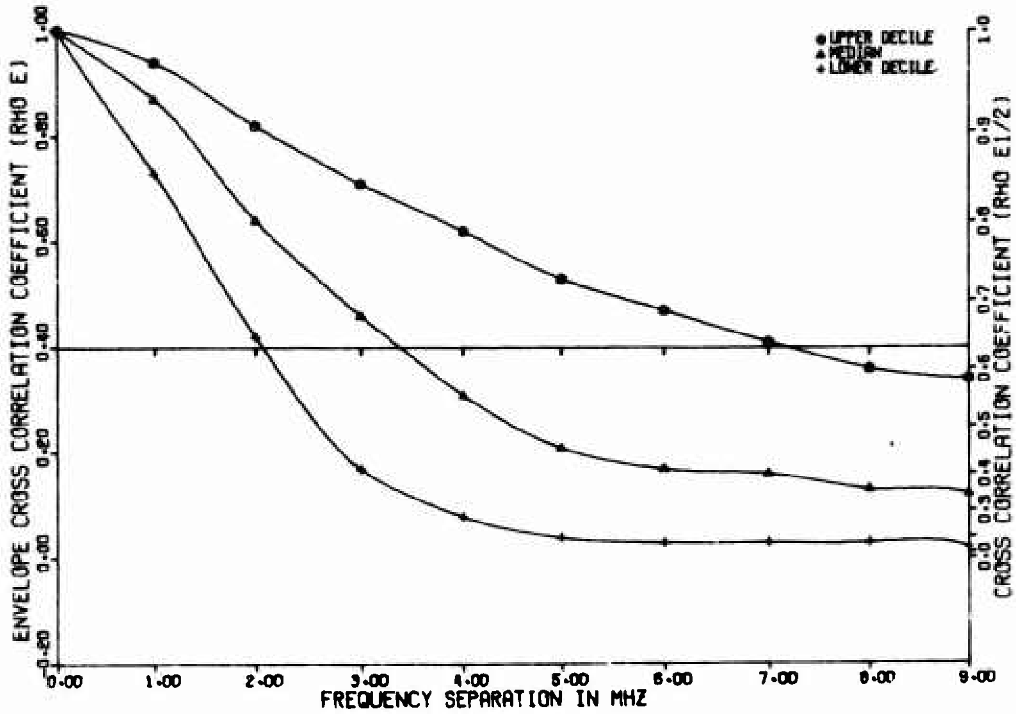
ENVELOPE CROSS CORRELATION COEFFICIENTS
WHITFORD FIELD, SUMMER, X-BAND
ALL, 21 TESTS

Figure 82.



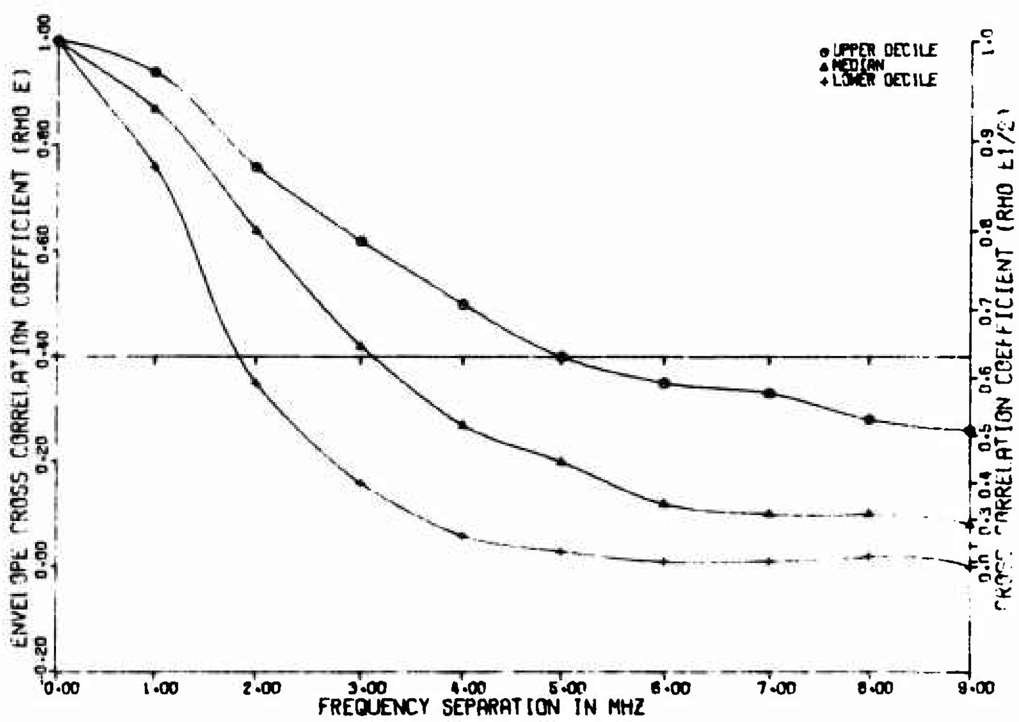
ENVELOPE CROSS CORRELATION COEFFICIENTS
WHITFORD FIELD, SUMMER, C-BAND
ALL, 49 TESTS

Figure 83.



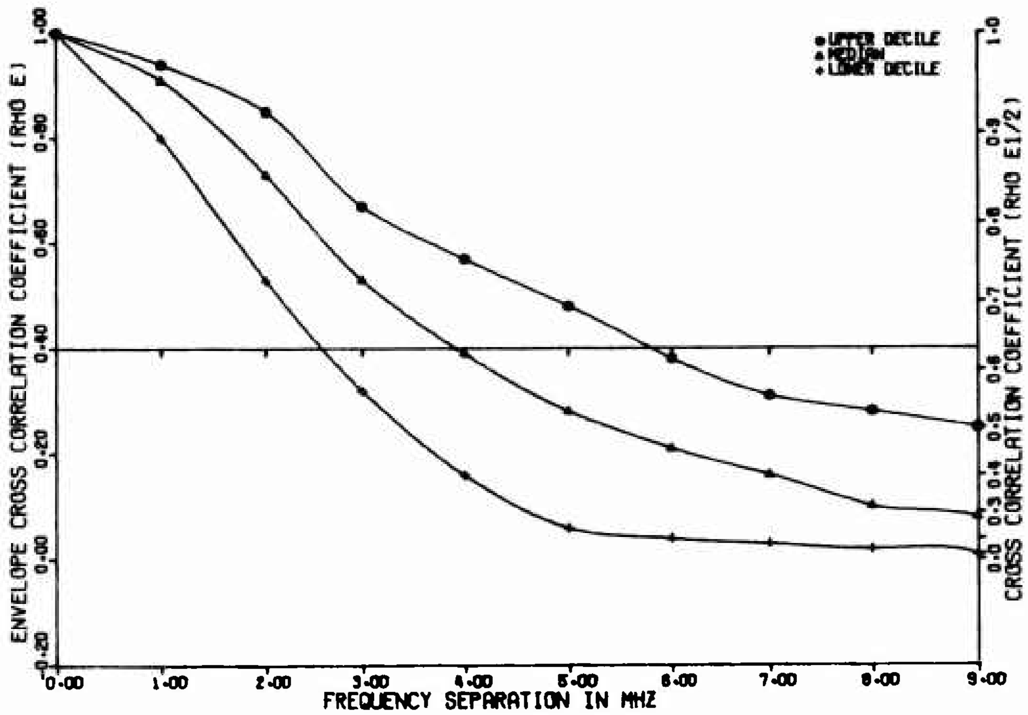
ENVELOPE CROSS CORRELATION COEFFICIENTS
POINT PETRE, SEPTEMBER, X-BAND
ALL, 81 TESTS

Figure 84.



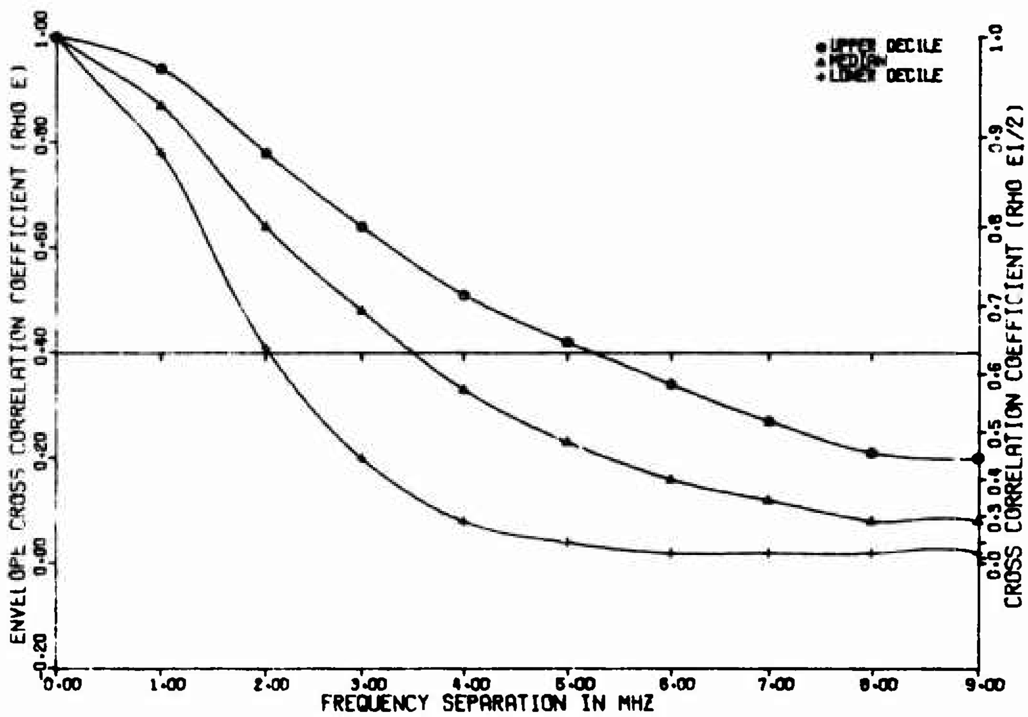
ENVELOPE CROSS CORRELATION CUEFFICIENTS
POINT PETRE, SEPTEMBER, C-BAND
ALL, 88 TESTS

Figure 85.



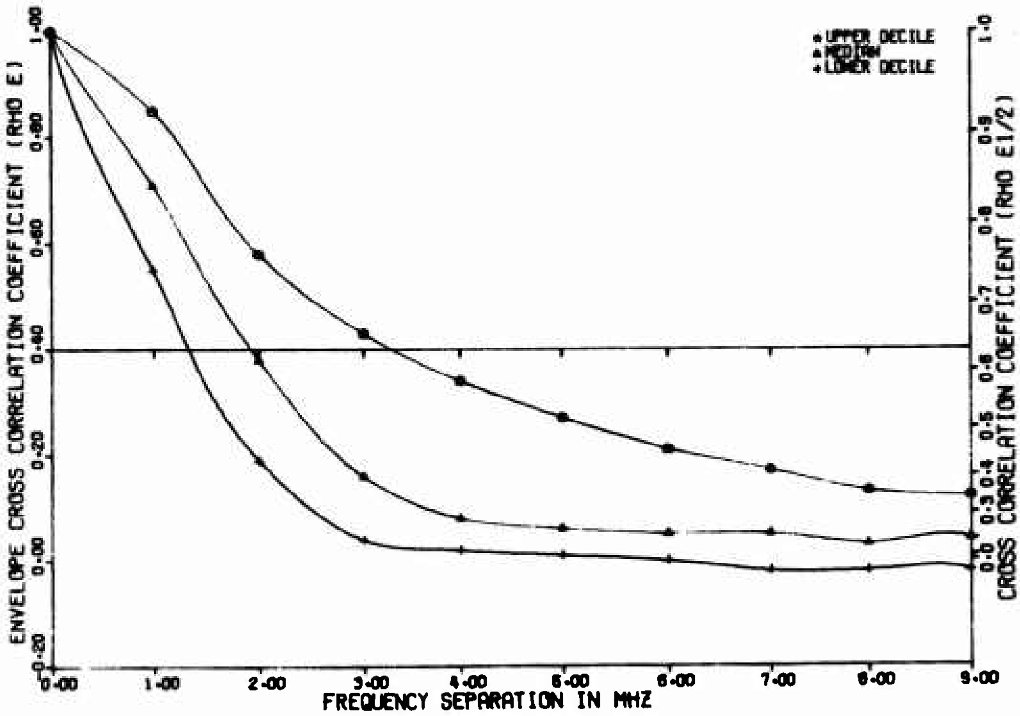
ENVELOPE CROSS CORRELATION COEFFICIENTS
ONTARIO CENTER, OCTOBER, X-BAND
ALL, 108 TESTS

Figure 86.



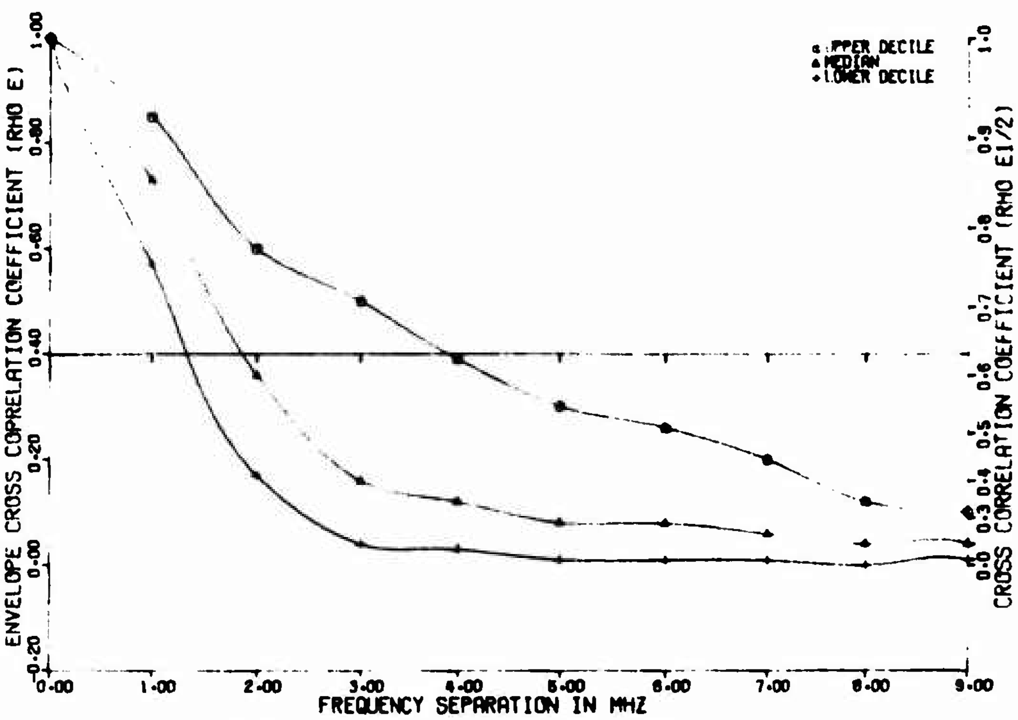
ENVELOPE CROSS CORRELATION COEFFICIENTS
ONTARIO CENTER, OCTOBER, C-BAND
ALL, 115 TESTS

Figure 87.



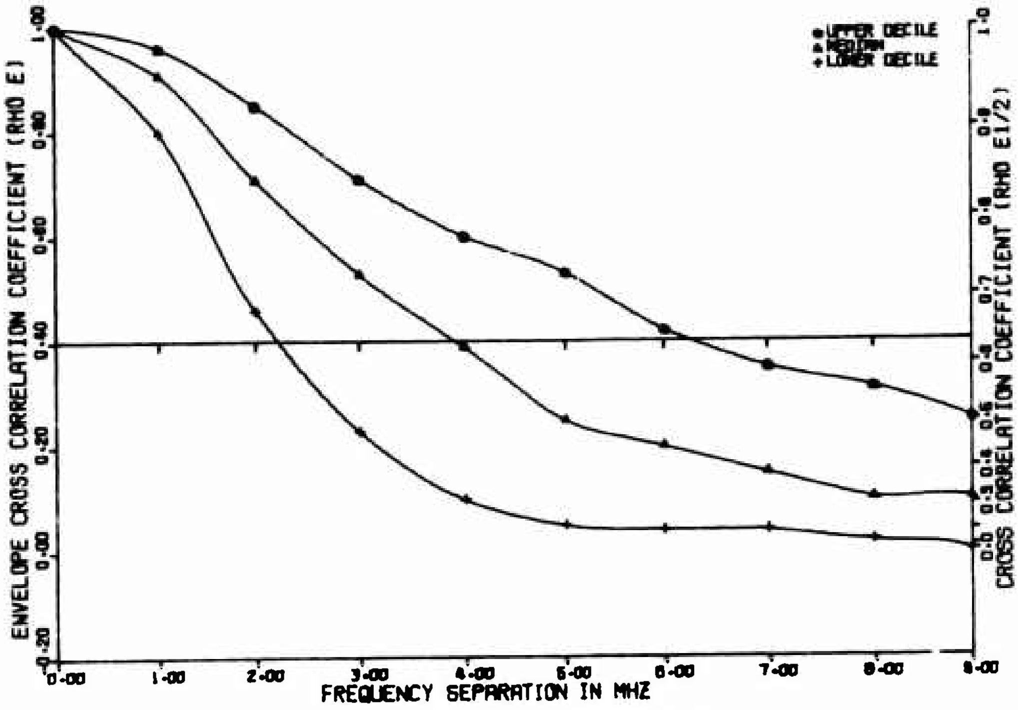
ENVELOPE CROSS CORRELATION COEFFICIENTS
WHITFORD FIELD, NOVEMBER, X-BAND
ALL, 72 TESTS

Figure 88.



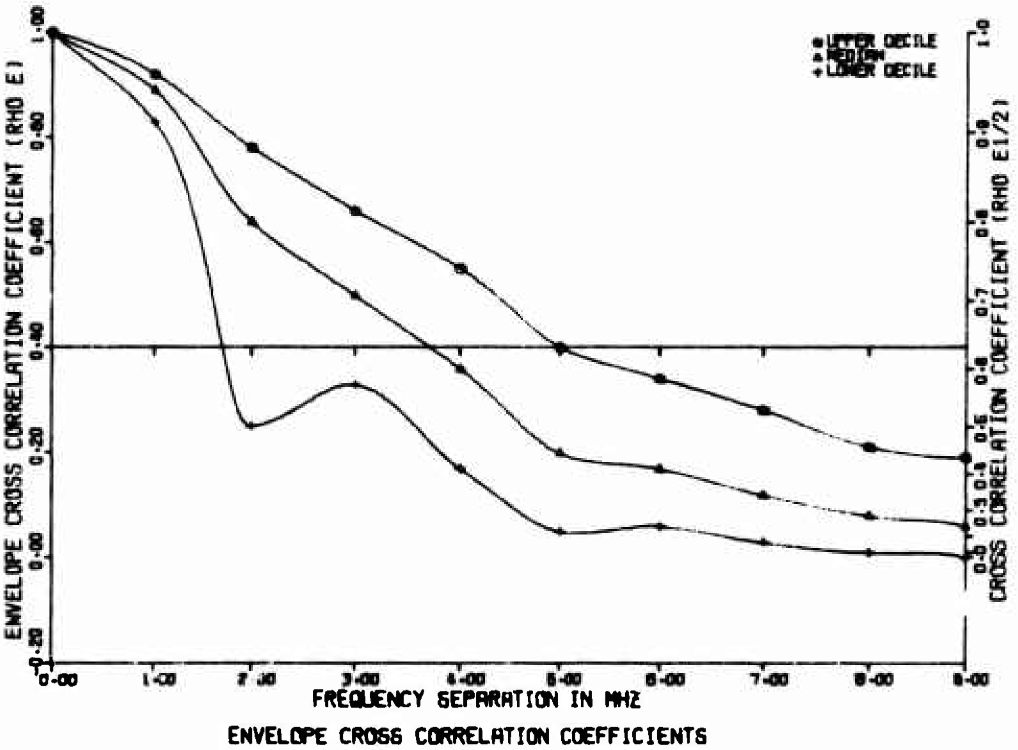
ENVELOPE CROSS CORRELATION COEFFICIENTS
WHITFORD FIELD, NOVEMBER, C-BAND
ALL, 47 TESTS

Figure 89.



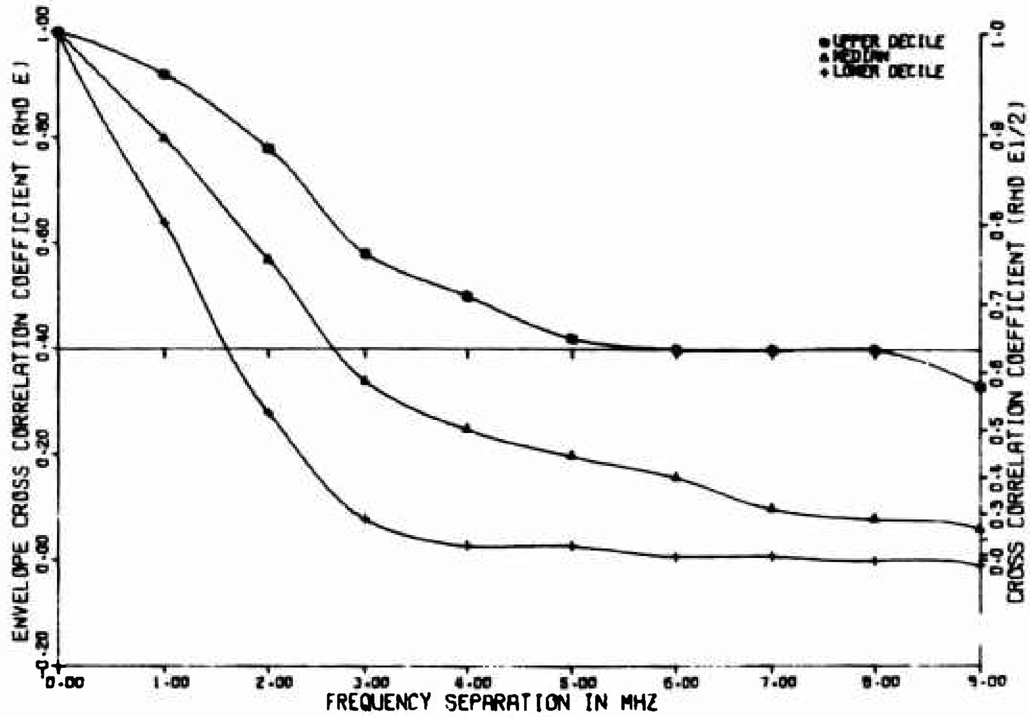
ENVELOPE CROSS CORRELATION COEFFICIENTS
POINT PETRE, WINTER, X-BAND
ALL, 100 TESTS

Figure 90.



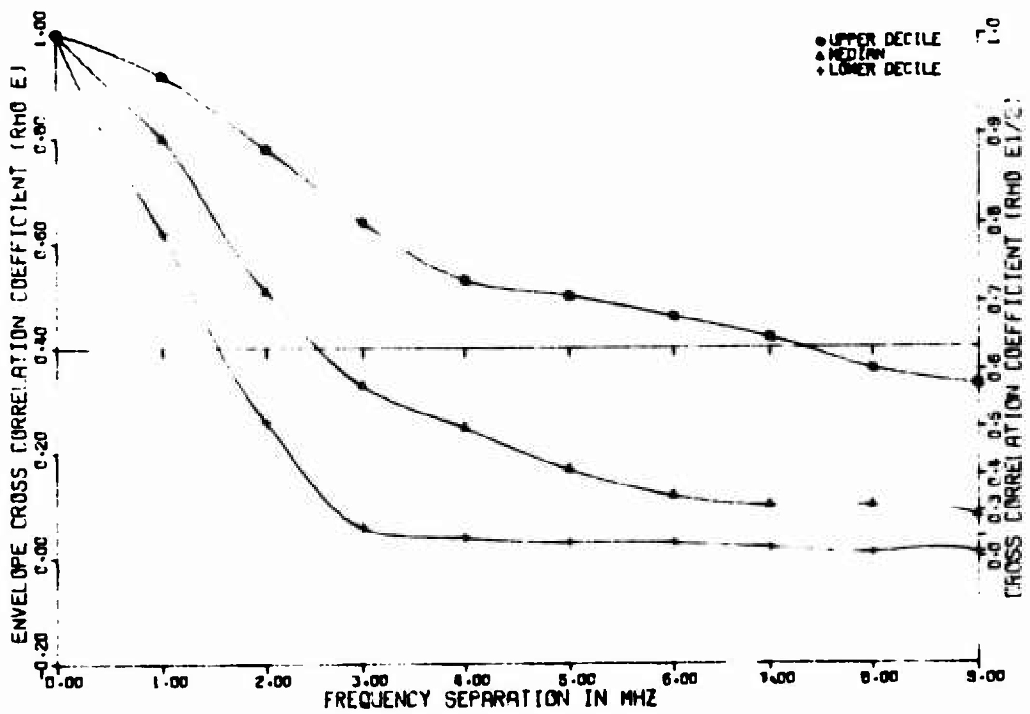
ENVELOPE CROSS CORRELATION COEFFICIENTS
POINT PETRE, WINTER, C-BAND
ALL, 108 TESTS

Figure 91.



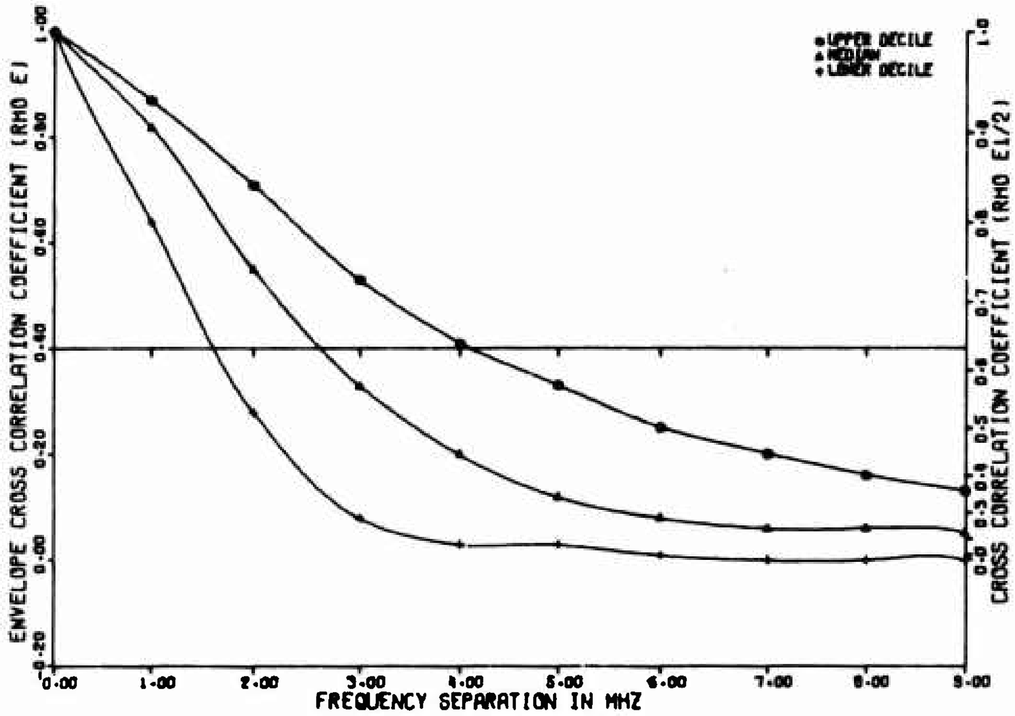
ENVELOPE CROSS CORRELATION COEFFICIENTS
ONTARIO CENTER, WINTER, X-BAND
ALL, 77 TESTS

Figure 92.



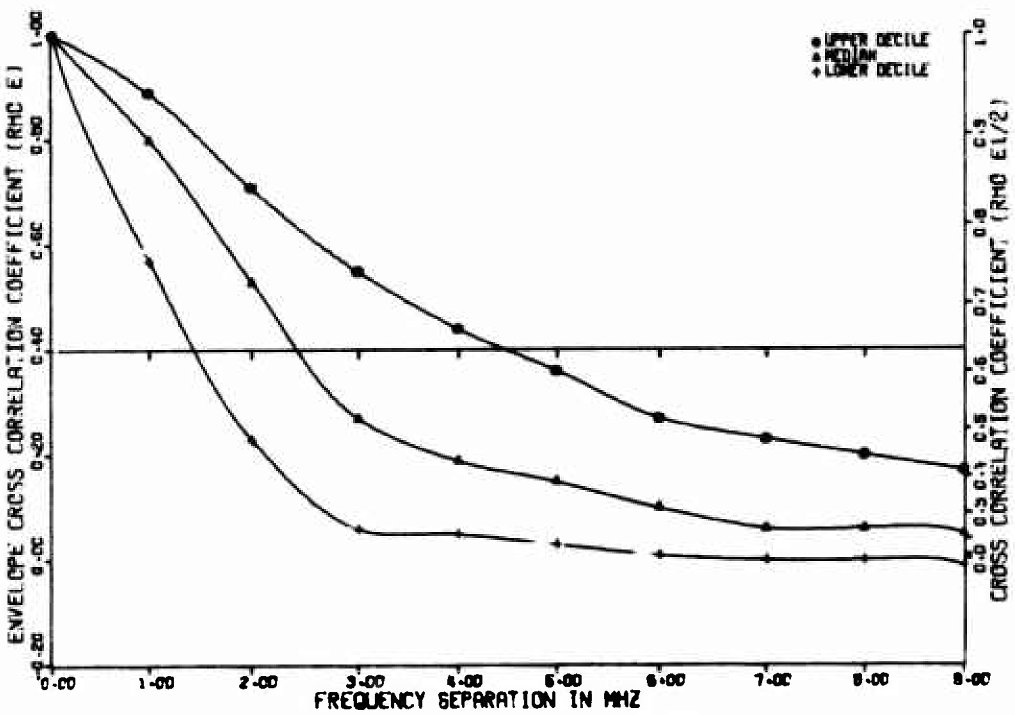
ENVELOPE CROSS CORRELATION COEFFICIENTS
ONTARIO CENTER, WINTER, C-BAND
ALL, 67 TESTS

Figure 93.



ENVELOPE CROSS CORRELATION COEFFICIENTS
PORT BYRON, FEBRUARY, X-BAND
ALL, 64 TESTS

Figure 94.



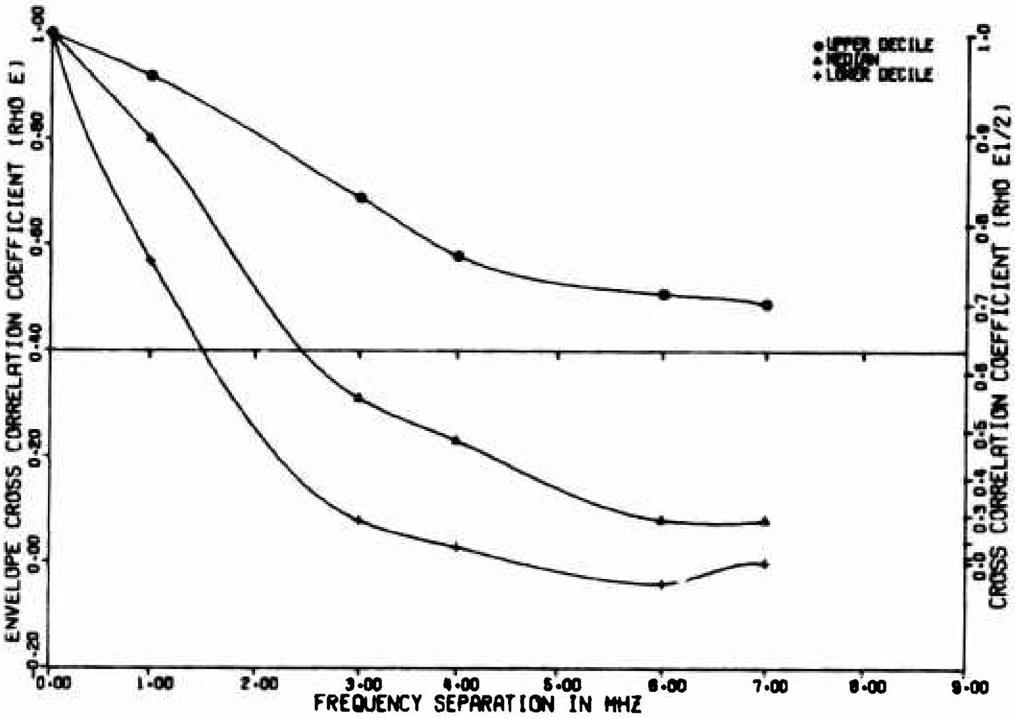
ENVELOPE CROSS CORRELATION COEFFICIENTS
PORT BYRON, FEBRUARY, C-BAND
ALL, 75 TESTS

Figure 95.

3. Correlation Bandwidth-Temperature Effects

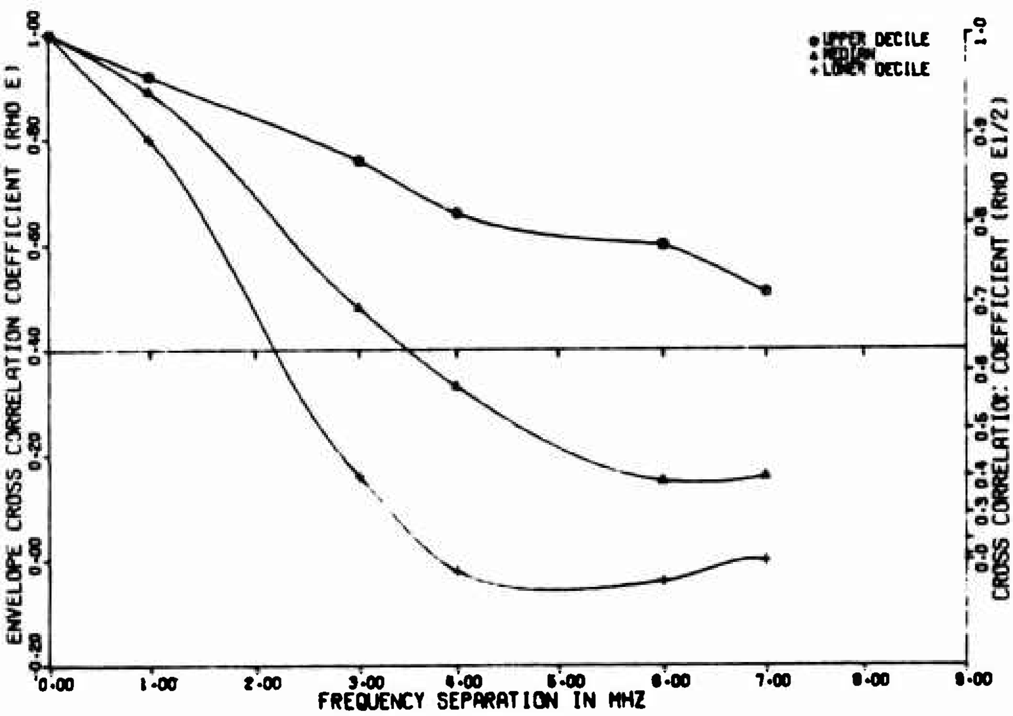
In a format similar to the preceding subsection, Figures 96 through 127 show the observed correlation function distributions, but further subdivided into two Fahrenheit temperature ranges. These temperature ranges are given on the figures and were chosen so that the crossover point is approximately the average temperature for the time and location of the measurements. The Whitford Field summer X-band data included insufficient tests in the lower temperature range (not over 77 degrees) to allow a determination of the upper and lower deciles.

There is a tendency for the median correlation bandwidth to be somewhat greater for the lower temperature ranges at both X- and C-band and for all of the paths. This is especially noticeable in the overwater Point Petre data collected during the September testing period.



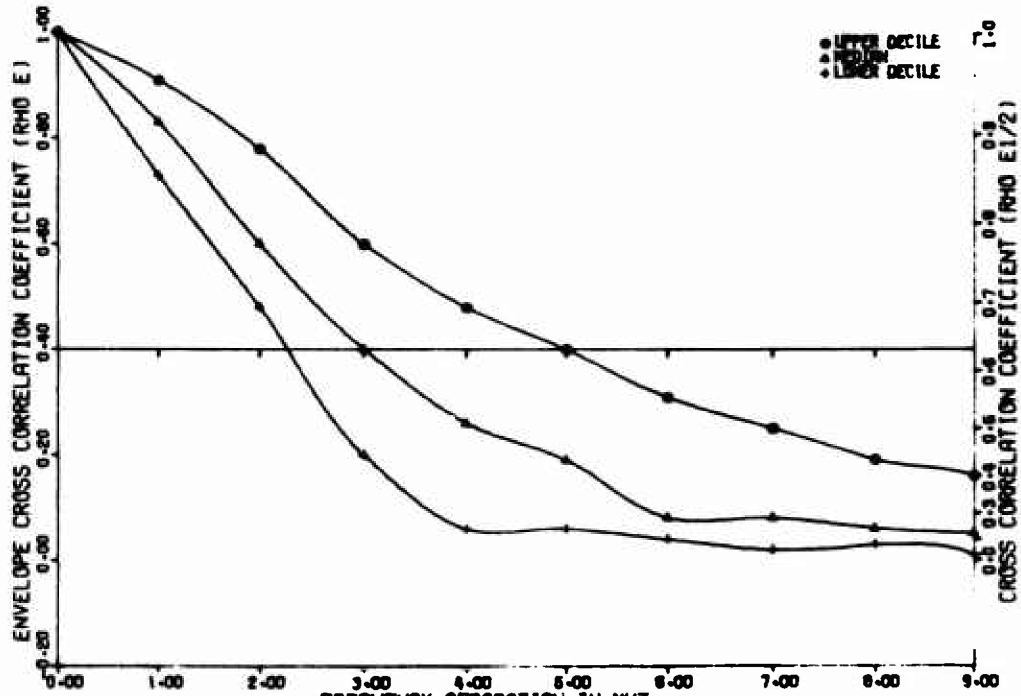
ENVELOPE CROSS CORRELATION COEFFICIENTS
ONTARIO CENTER, SUMMER, X-BAND
TEMPERATURE OVER 77 DEGREES F., 40 TESTS

Figure 96.



ENVELOPE CROSS CORRELATION COEFFICIENTS
ONTARIO CENTER, SUMMER, X-BAND
TEMPERATURE NOT OVER 77 DEGREES F., 41 TESTS

Figure 97.

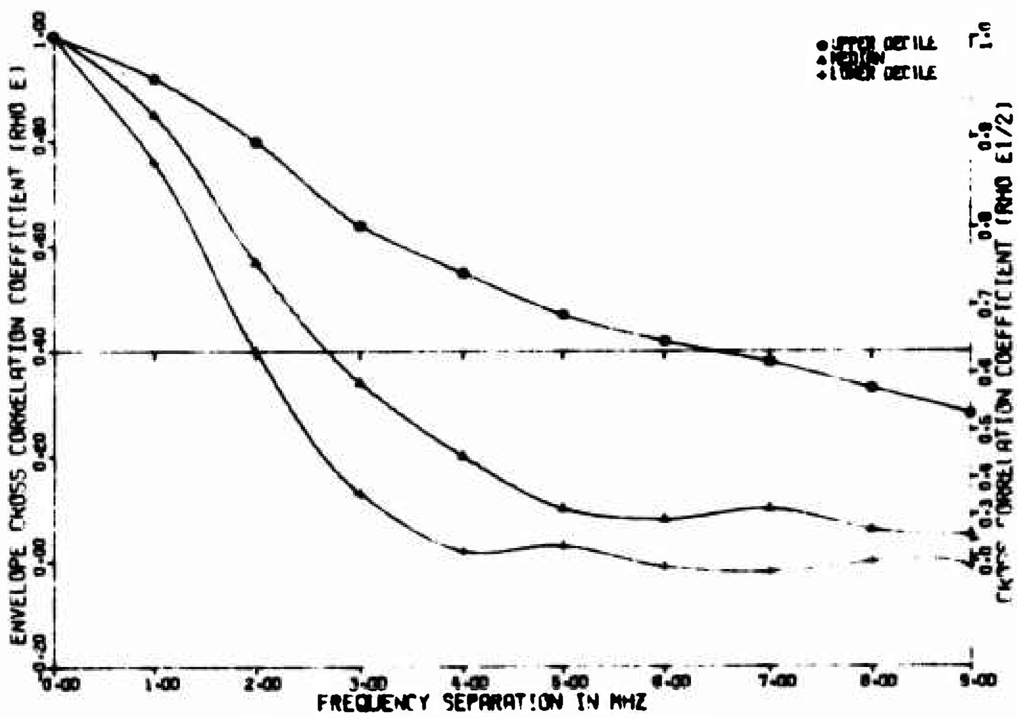


ENVELOPE CROSS CORRELATION COEFFICIENTS

ONTARIO CENTER, SUMMER, C-BAND

TEMPERATURE OVER 77 DEGREES F., 14 TESTS

Figure 98.

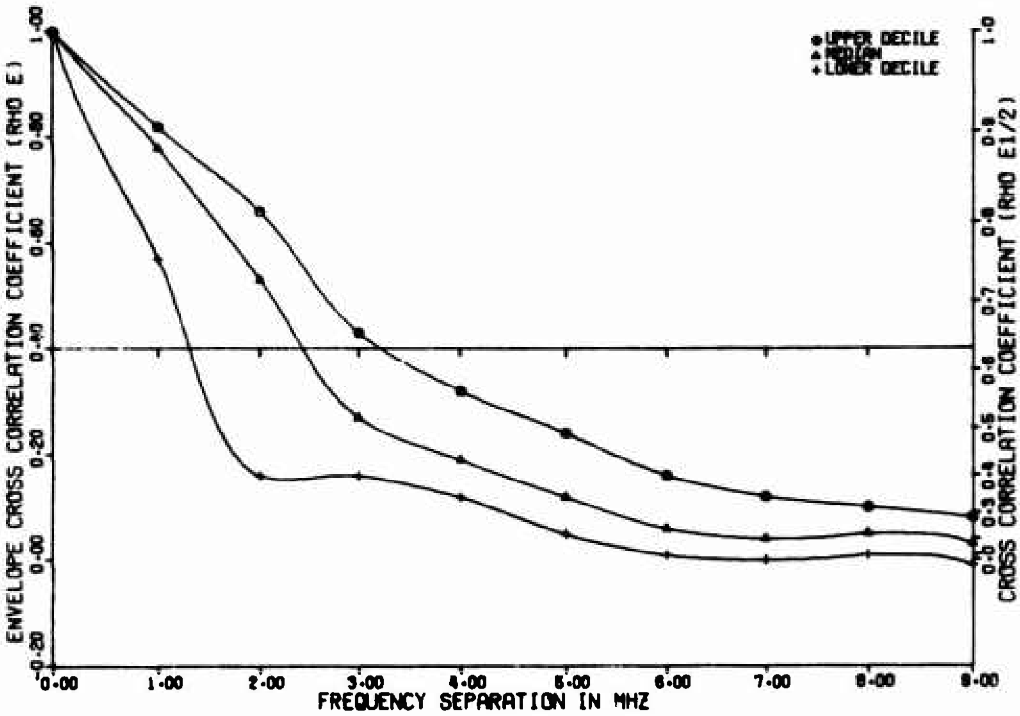


ENVELOPE CROSS CORRELATION COEFFICIENTS

ONTARIO CENTER, SUMMER, C-BAND

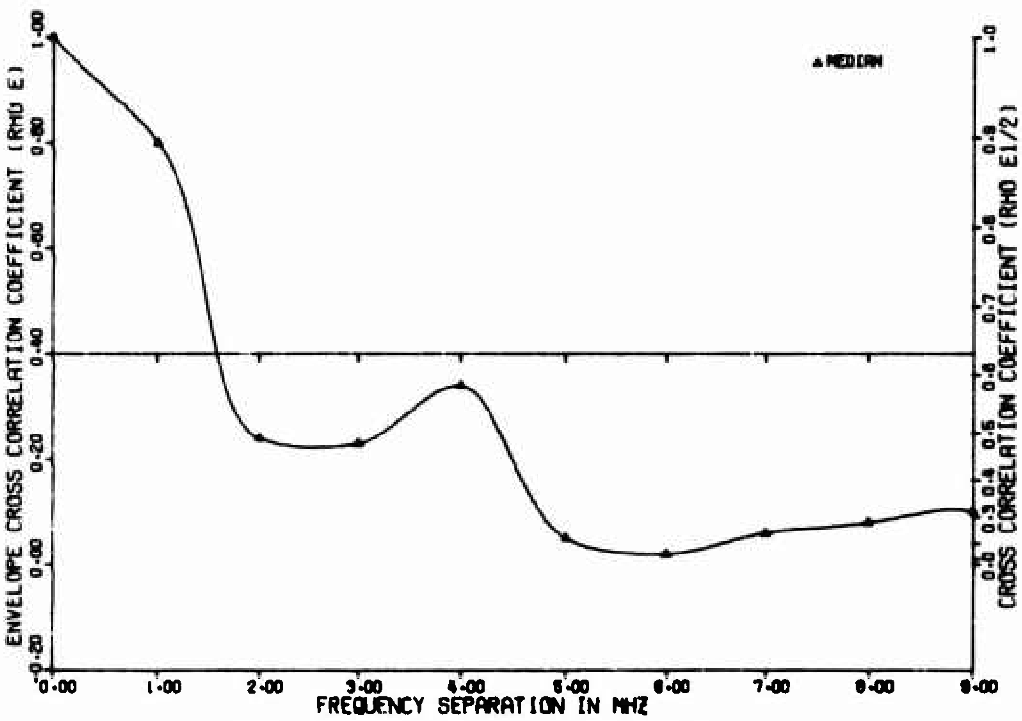
TEMPERATURE NOT OVER 77 DEGREES F., 31 TESTS

Figure 99.



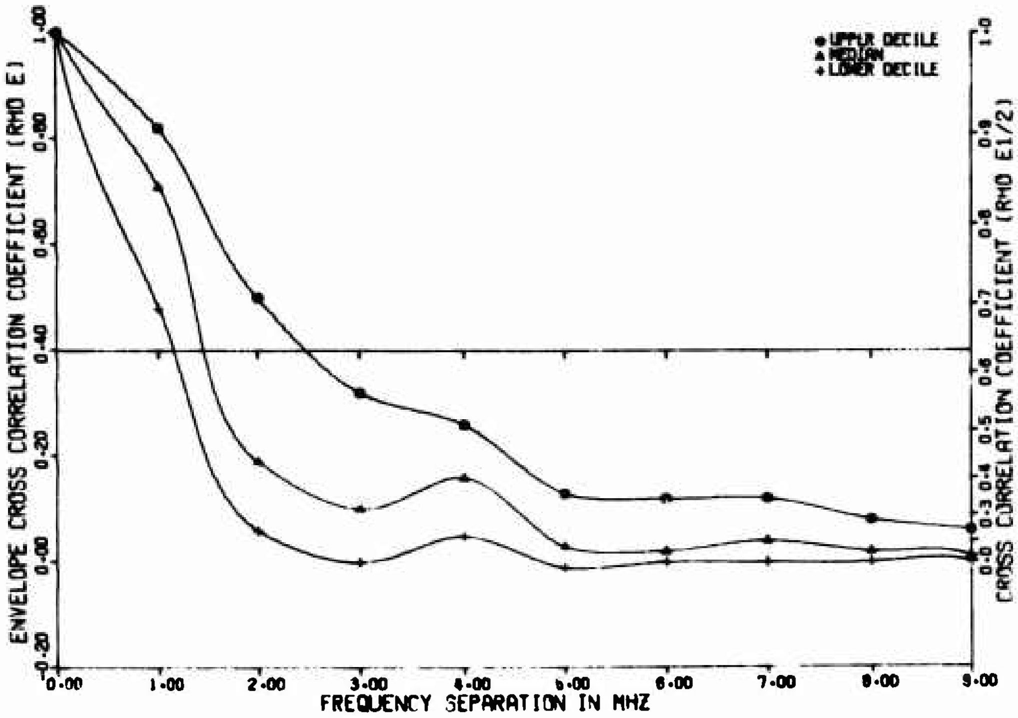
ENVELOPE CROSS CORRELATION COEFFICIENTS
WHITFORD FIELD, SUMMER, X-BAND
TEMPERATURE OVER 77 DEGREES F., 12 TESTS

Figure 100.



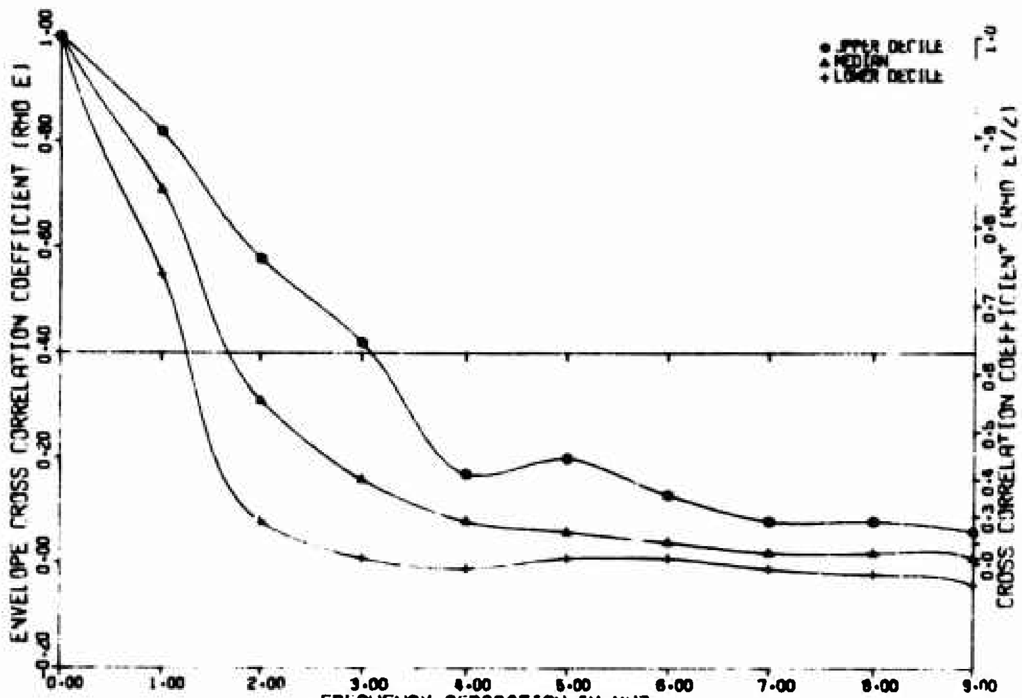
ENVELOPE CROSS CORRELATION COEFFICIENTS
WHITFORD FIELD, SUMMER, X-BAND
TEMPERATURE NOT OVER 77 DEGREES F., 9 TESTS

Figure 101.



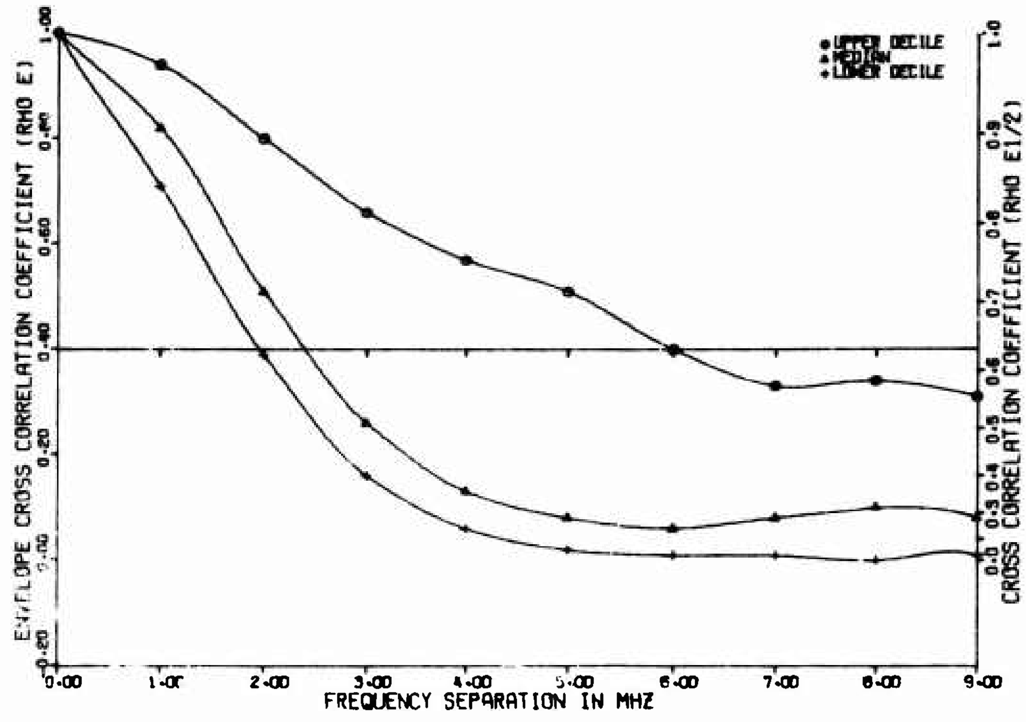
ENVELOPE CROSS CORRELATION COEFFICIENTS
WHITFORD FIELD, SUMMER, C-BAND
TEMPERATURE OVER 77 DEGREES F., 13 TESTS

Figure 102.



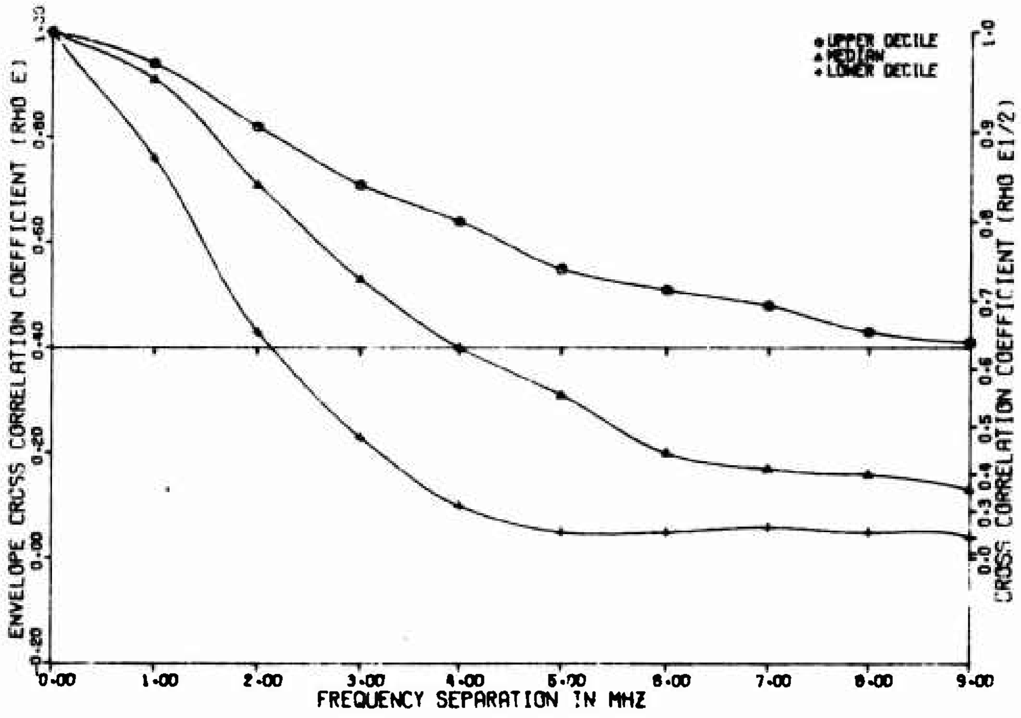
ENVELOPE CROSS CORRELATION COEFFICIENTS
WHITFORD FIELD, SUMMER, C-BAND
TEMPERATURE NOT OVER 77 DEGREES F., 36 TESTS

Figure 103.



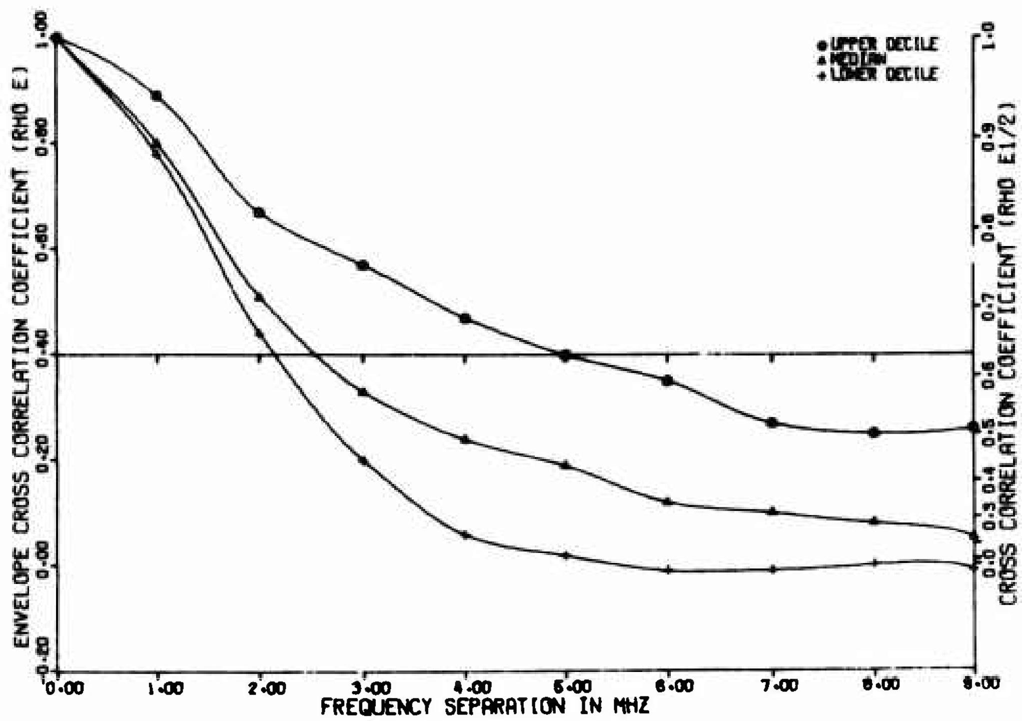
ENVELOPE CROSS CORRELATION COEFFICIENTS
POINT PETRE, SEPTEMBER, X-BAND
TEMPERATURE OVER 57 DEGREES F., 25 TESTS

Figure 104.



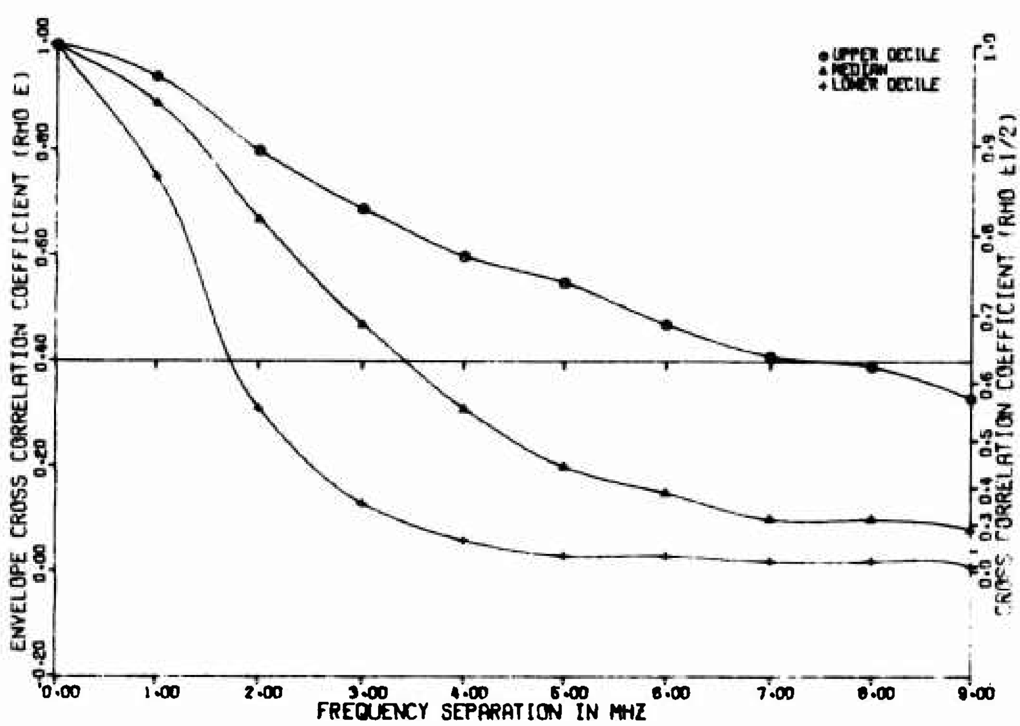
ENVELOPE CROSS CORRELATION COEFFICIENTS
POINT PETRE, SEPTEMBER, X-BAND
TEMPERATURE NOT OVER 57 DEGREES F., 58 TESTS

Figure 105.



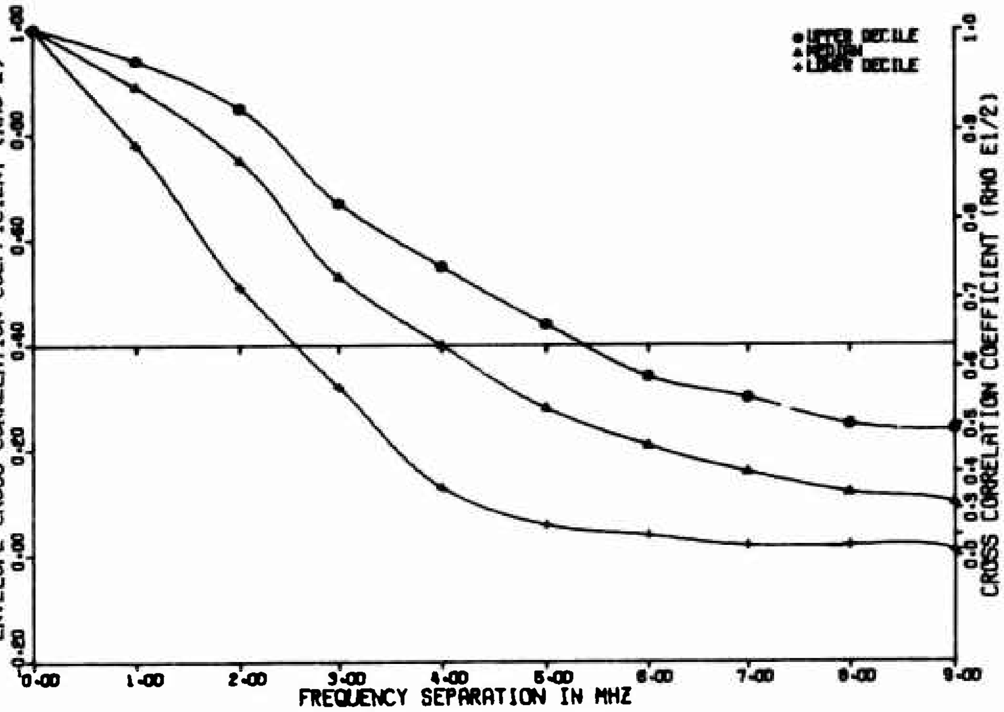
ENVELOPE CROSS CORRELATION COEFFICIENTS
POINT PETRE, SEPTEMBER, C-BAND
TEMPERATURE OVER 57 DEGREES F., 2[illegible]

Figure 106.



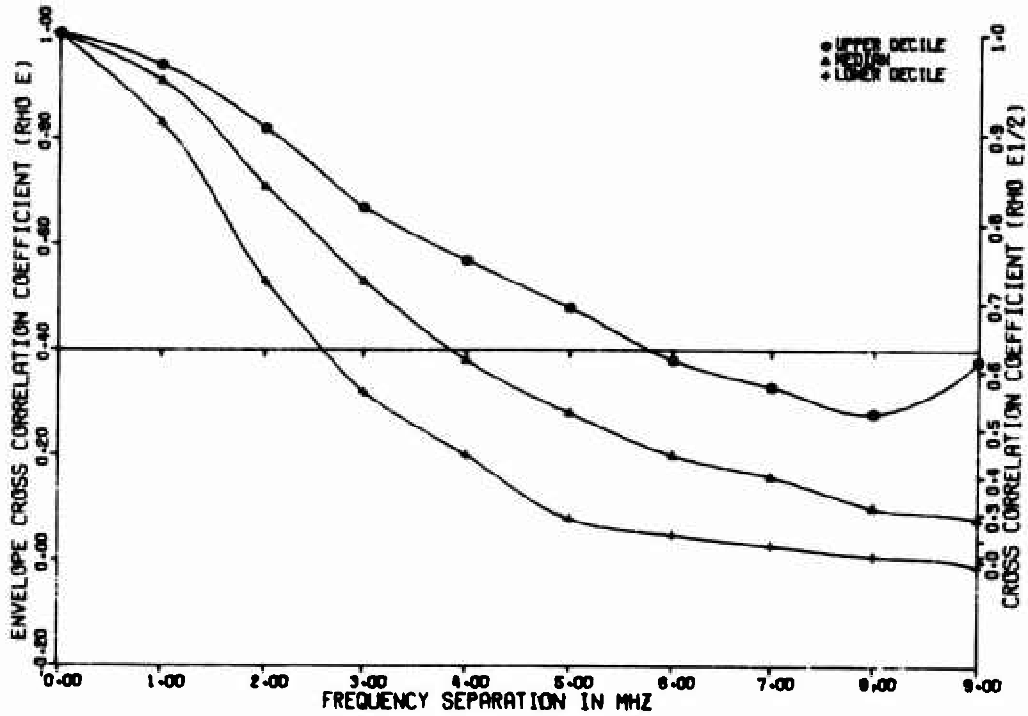
ENVELOPE CROSS CORRELATION COEFFICIENTS
POINT PETRE, SEPTEMBER, C-BAND
TEMPERATURE NOT OVER 57 DEGREES F., 58 TESTS

Figure 107.



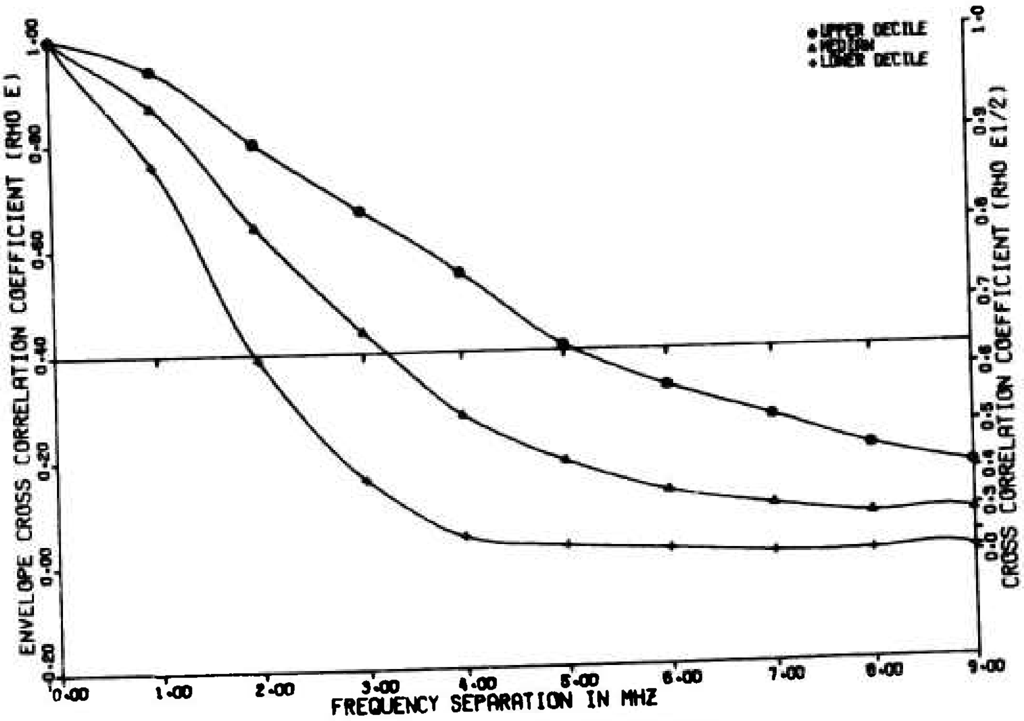
ENVELOPE CROSS CORRELATION COEFFICIENTS
ONTARIO CENTER, OCTOBER, X-BAND
TEMPERATURE OVER 57 DEGREES F., 55 TESTS

Figure 108.



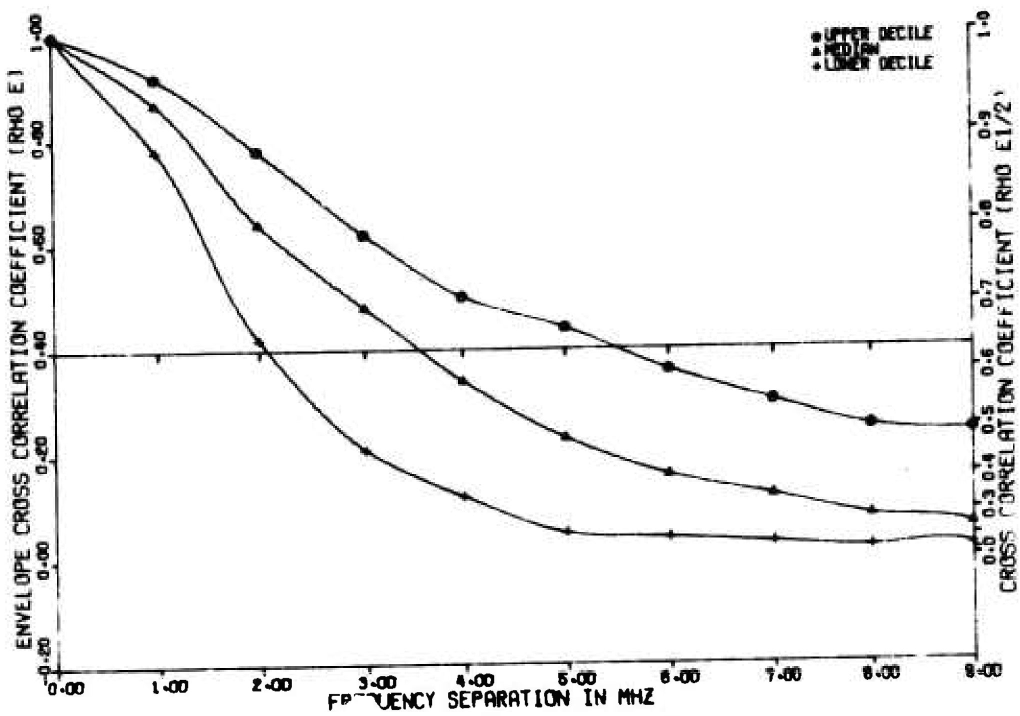
ENVELOPE CROSS CORRELATION COEFFICIENTS
ONTARIO CENTER, OCTOBER, X-BAND
TEMPERATURE NOT OVER 57 DEGREES F., 54 TESTS

Figure 109.



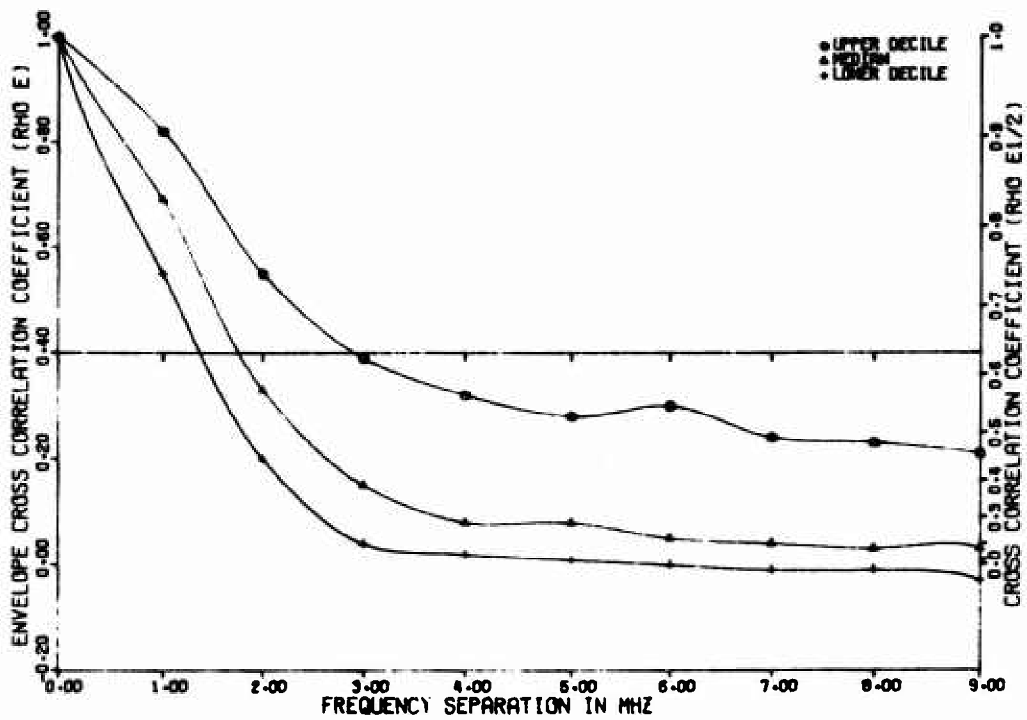
ENVELOPE CROSS CORRELATION COEFFICIENTS
ONTARIO CENTER, OCTOBER, C-BAND
TEMPERATURE OVER 57 DEGREES F., 58 TESTS

Figure 110.



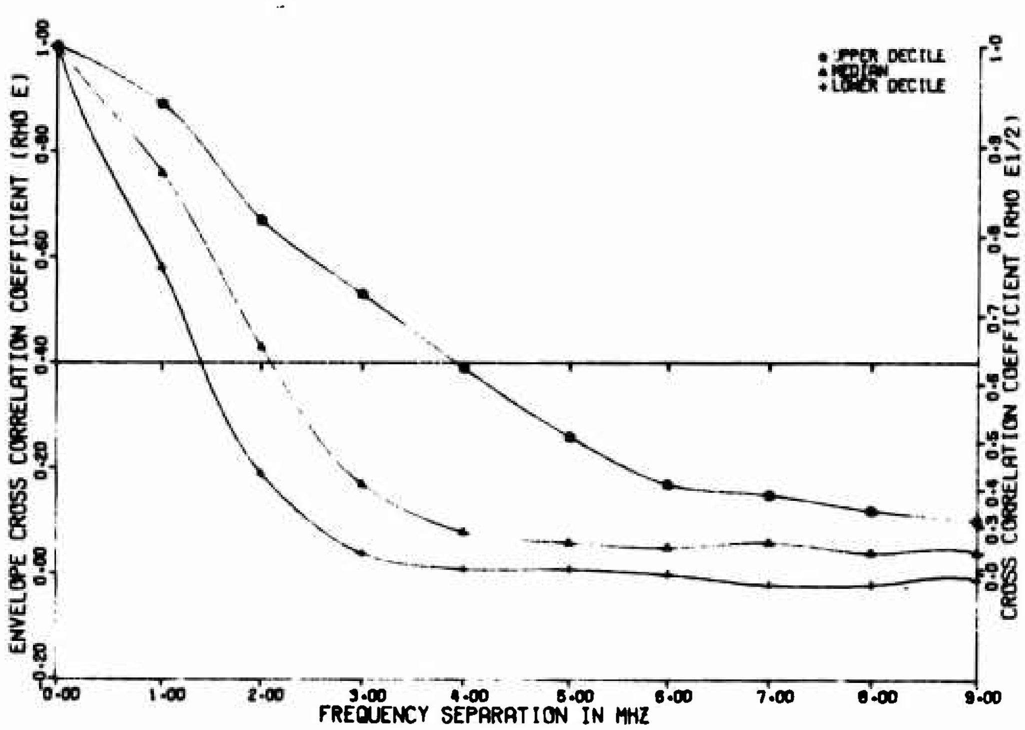
ENVELOPE CROSS CORRELATION COEFFICIENTS
ONTARIO CENTER, OCTOBER, C-BAND
TEMPERATURE NOT OVER 57 DEGREES F., 57 TESTS

Figure 111.



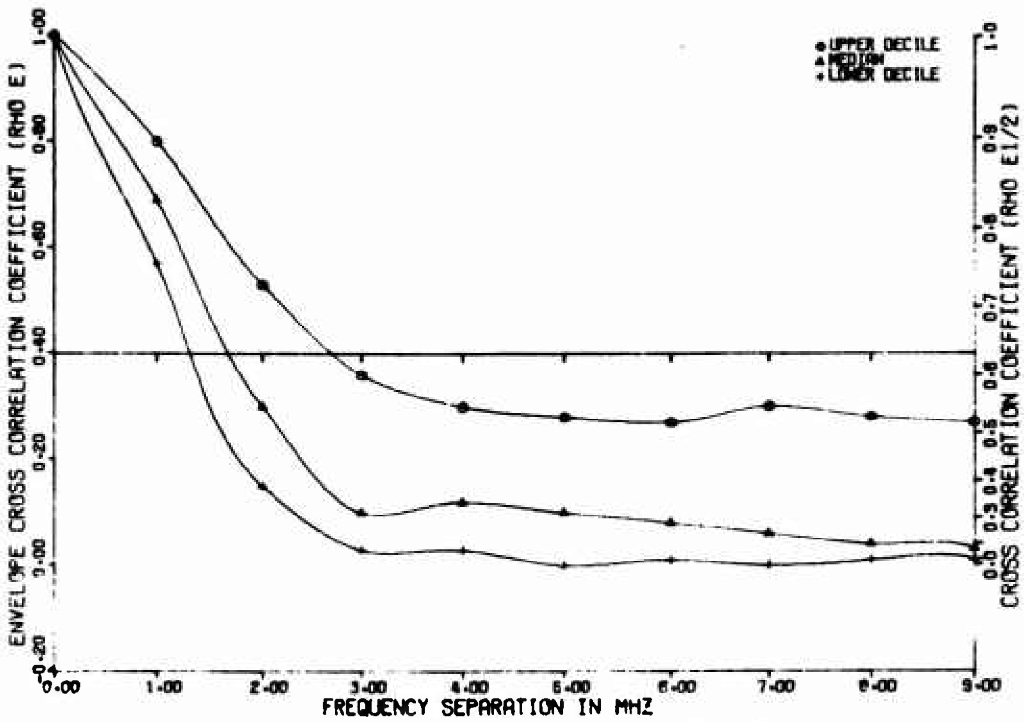
ENVELOPE CROSS CORRELATION COEFFICIENTS
WHITFORD FIELD, NOVEMBER, X-BAND
TEMPERATURE OVER 49 DEGREES F., 32 TESTS

Figure 112.



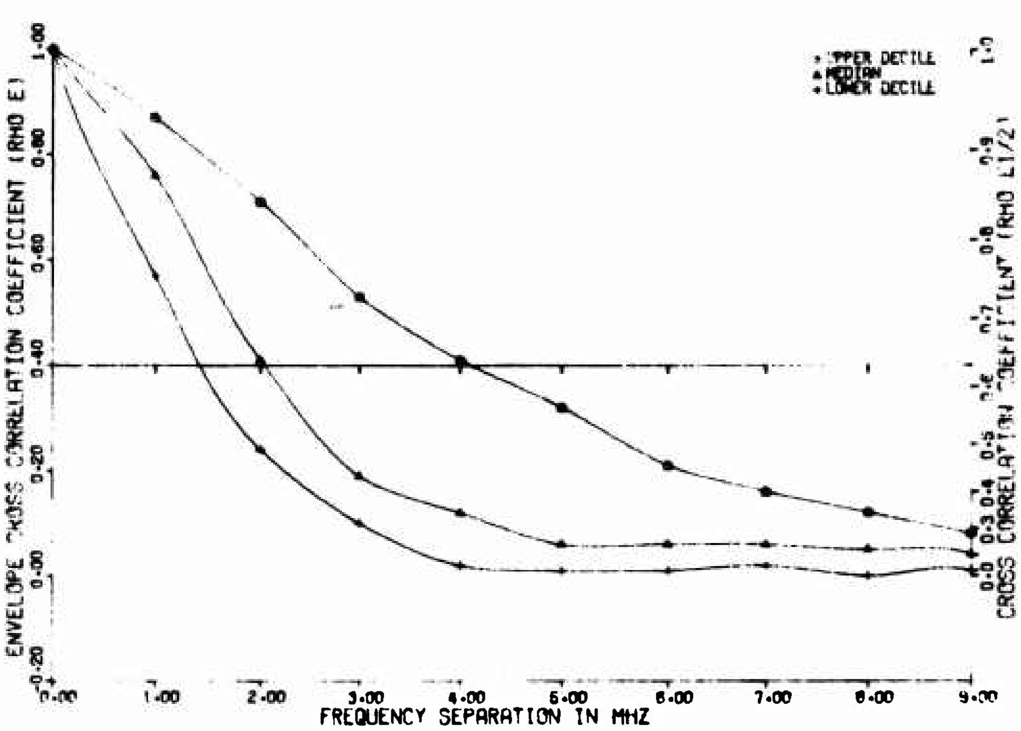
ENVELOPE CROSS CORRELATION COEFFICIENTS
WHITFORD FIELD, NOVEMBER, X-BAND
TEMPERATURE NOT OVER 49 DEGREES F., 40 TESTS

Figure 113.



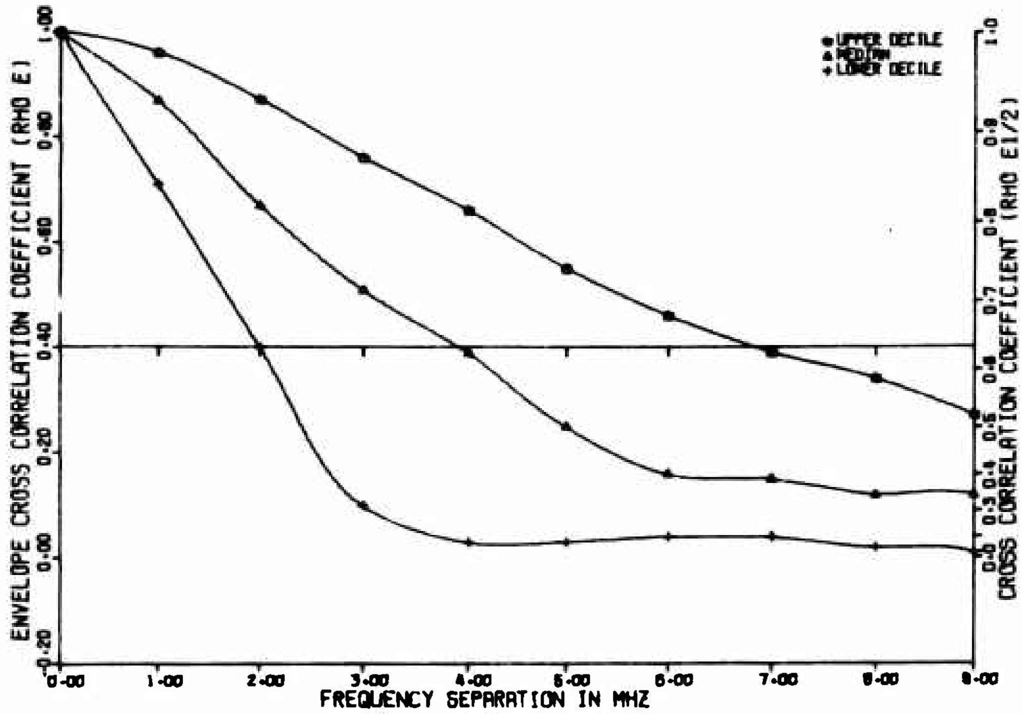
ENVELOPE CROSS CORRELATION COEFFICIENTS
WHITFORD FIELD, NOVEMBER, C-BAND
TEMPERATURE OVER 49 DEGREES F., 26 TESTS

Figure 114.



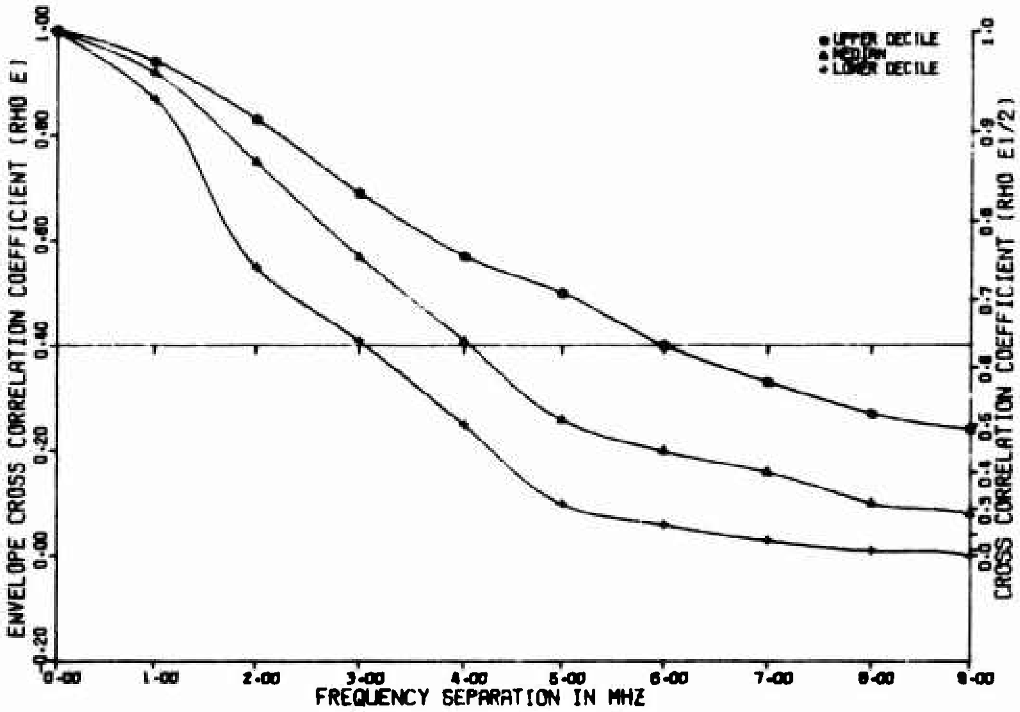
ENVELOPE CROSS CORRELATION COEFFICIENTS
WHITFORD FIELD, NOVEMBER, C-BAND
TEMPERATURE NOT OVER 49 DEGREES F., 22 TESTS

Figure 115.



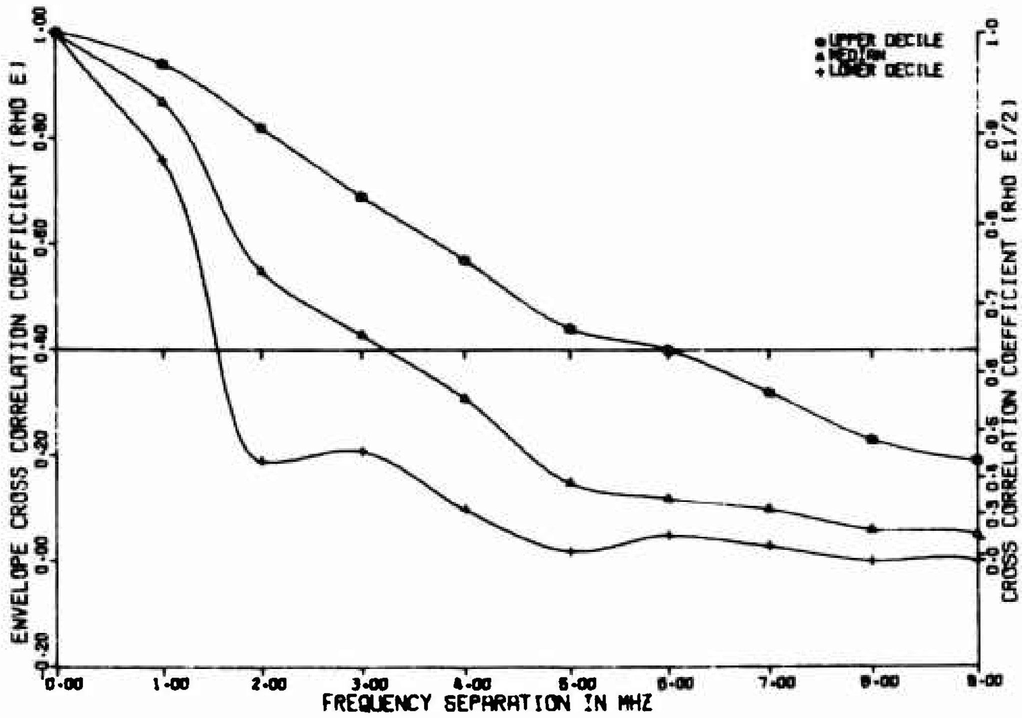
ENVELOPE CROSS CORRELATION COEFFICIENTS
POINT PETRE, WINTER, X-BAND
TEMPERATURE OVER 21 DEGREES F., 51 TESTS

Figure 116.



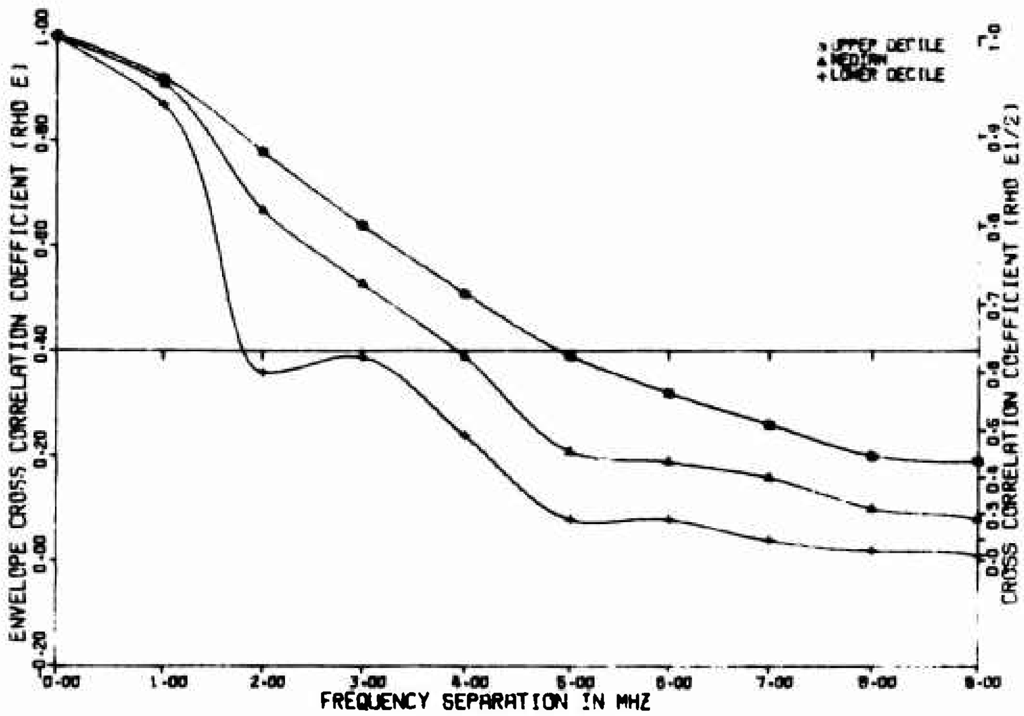
ENVELOPE CROSS CORRELATION COEFFICIENTS
POINT PETRE, WINTER, X-BAND
TEMPERATURE NOT OVER 21 DEGREES F., 49 TESTS

Figure 117.



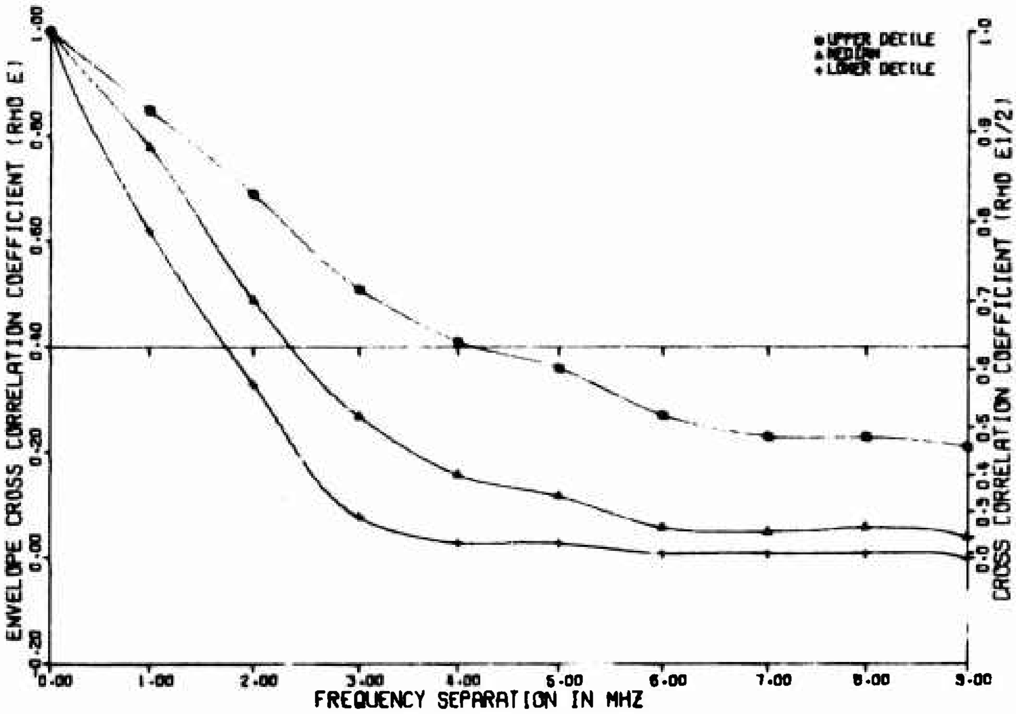
ENVELOPE CROSS CORRELATION COEFFICIENTS
POINT PETRE, WINTER, C-BAND
TEMPERATURE OVER 21 DEGREES F., 45 TESTS

Figure 118.



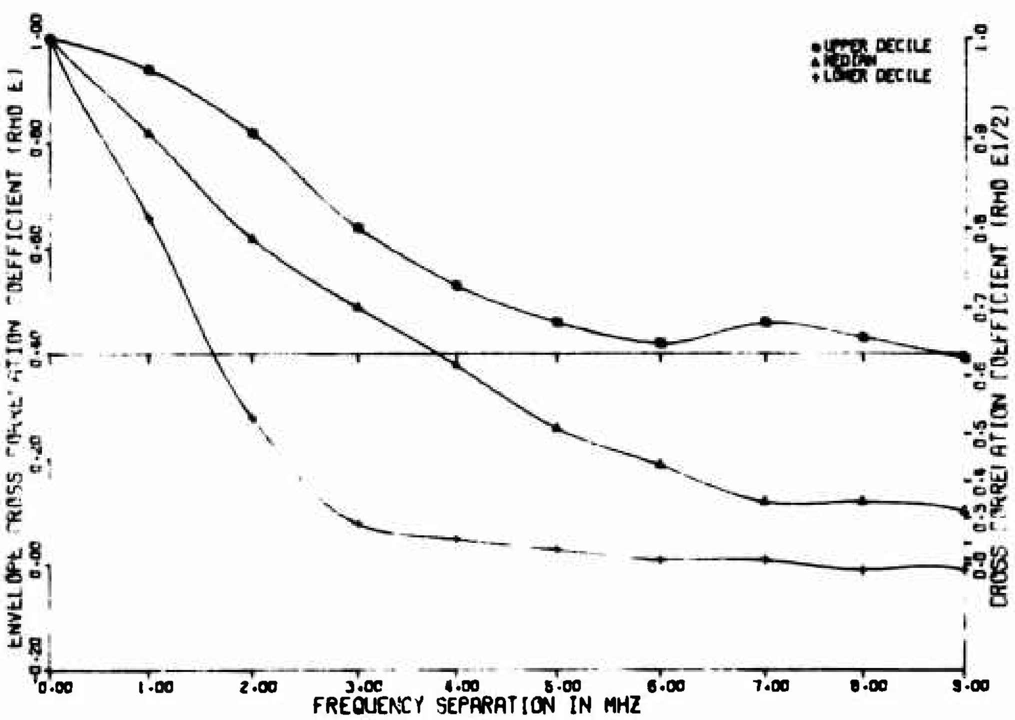
ENVELOPE CROSS CORRELATION COEFFICIENTS
POINT PETRE, WINTER, C-BAND
TEMPERATURE NOT OVER 21 DEGREES F., 61 TESTS

Figure 119.



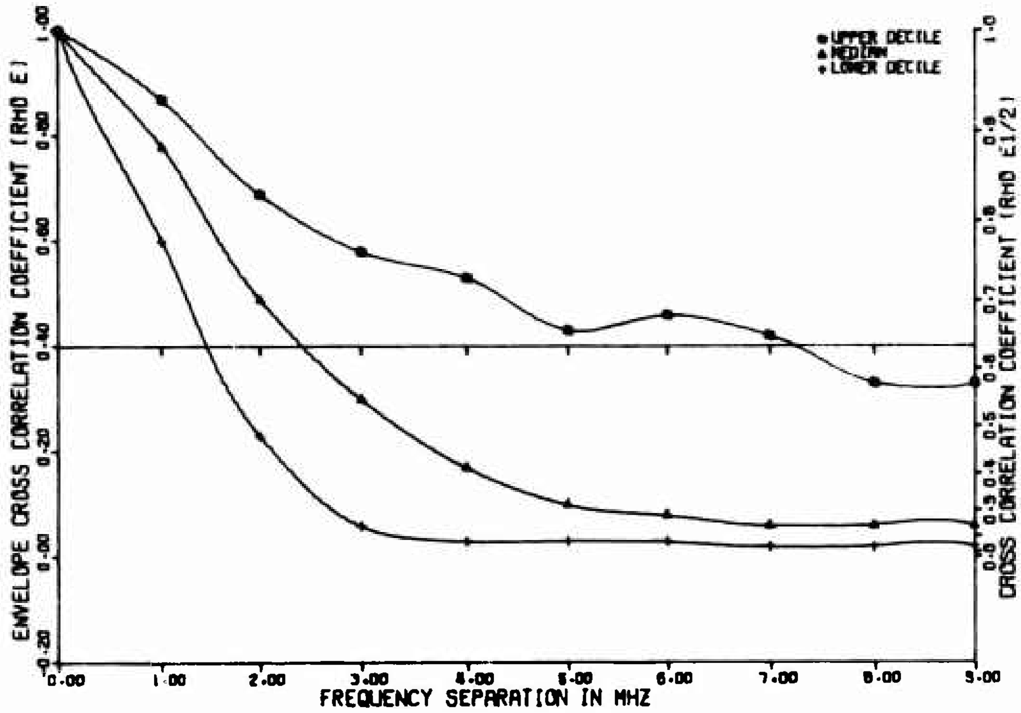
ENVELOPE CROSS CORRELATION COEFFICIENTS
ONTARIO CENTER, WINTER, X-BAND
TEMPERATURE OVER 29 DEGREES F., 42 TESTS

Figure 120.



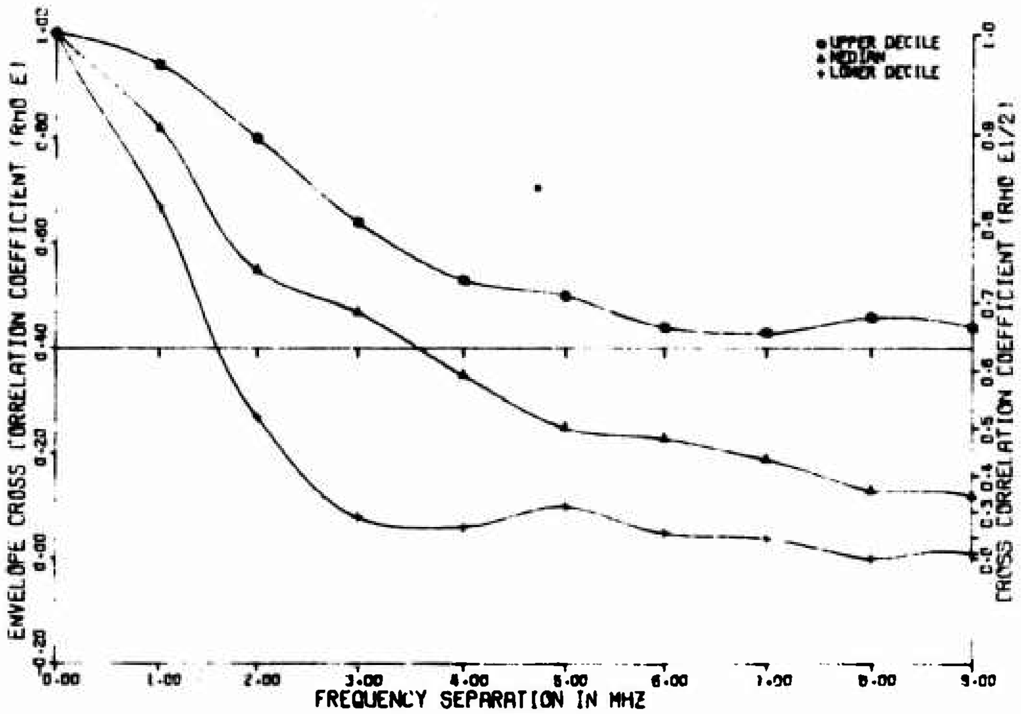
ENVELOPE CROSS CORRELATION COEFFICIENTS
ONTARIO CENTER, WINTER, X-BAND
TEMPERATURE NOT OVER 29 DEGREES F., 35 TESTS

Figure 121.



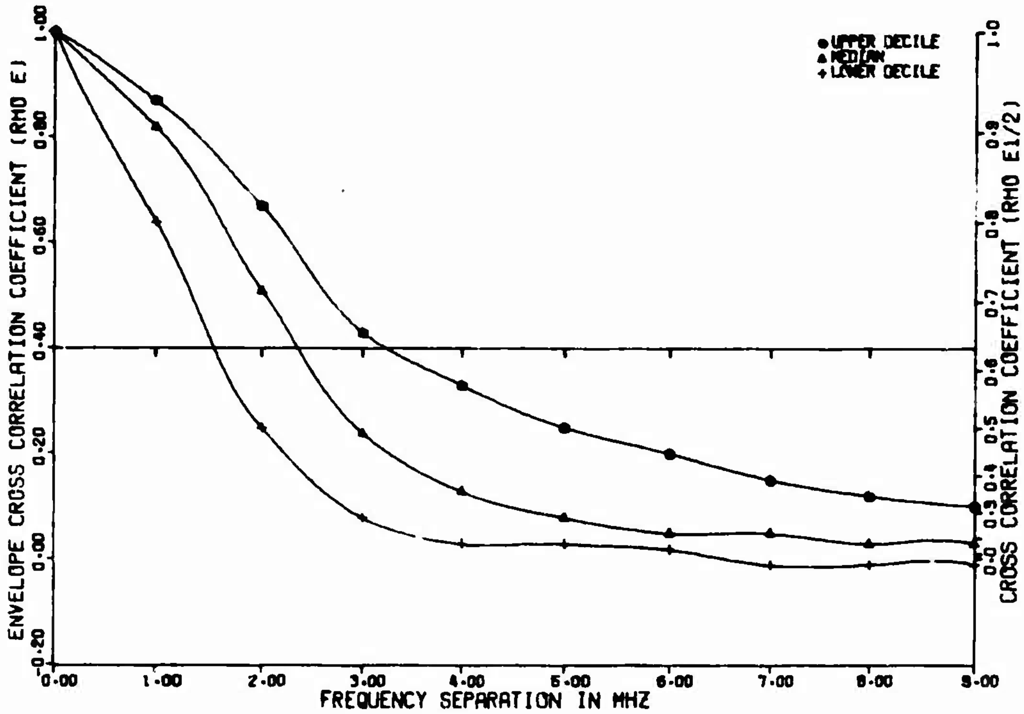
ENVELOPE CROSS CORRELATION COEFFICIENTS
ONTARIO CENTER, WINTER, C-BAND
TEMPERATURE OVER 29 DEGREES F., 36 TESTS

Figure 122.



ENVELOPE CROSS CORRELATION COEFFICIENTS
ONTARIO CENTER, WINTER, C-BAND
TEMPERATURE NOT OVER 29 DEGREES F., 31 TESTS

Figure 123.

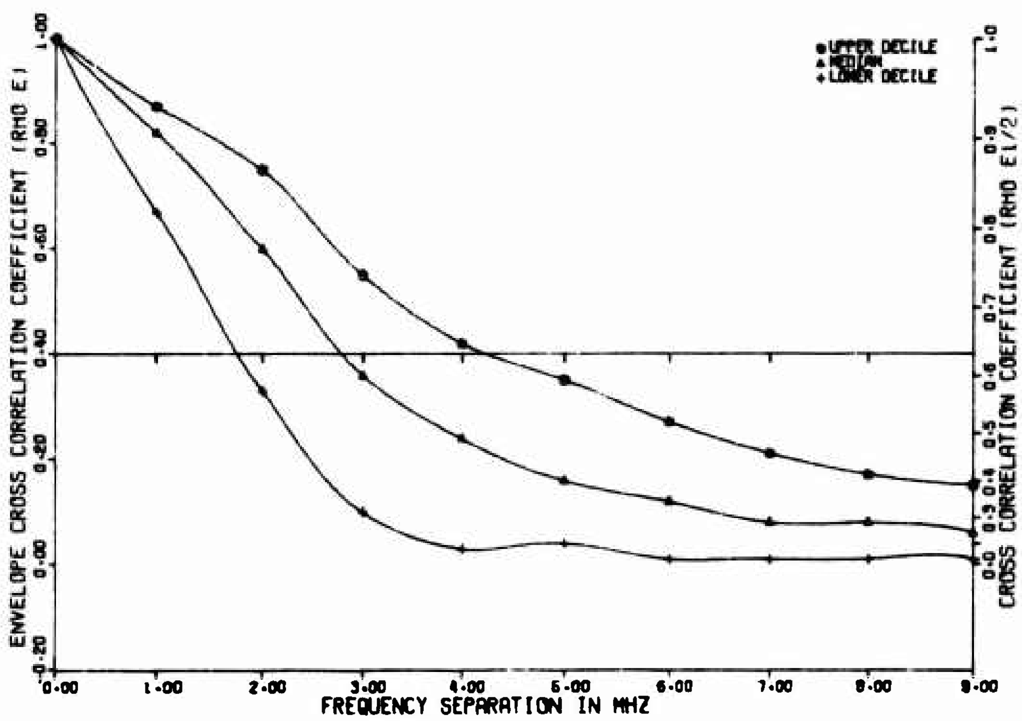


ENVELOPE CROSS CORRELATION COEFFICIENTS

PORT BYRON, FEBRUARY, X-BAND

TEMPERATURE OVER 33 DEGREES F., 32 TESTS

Figure 124.

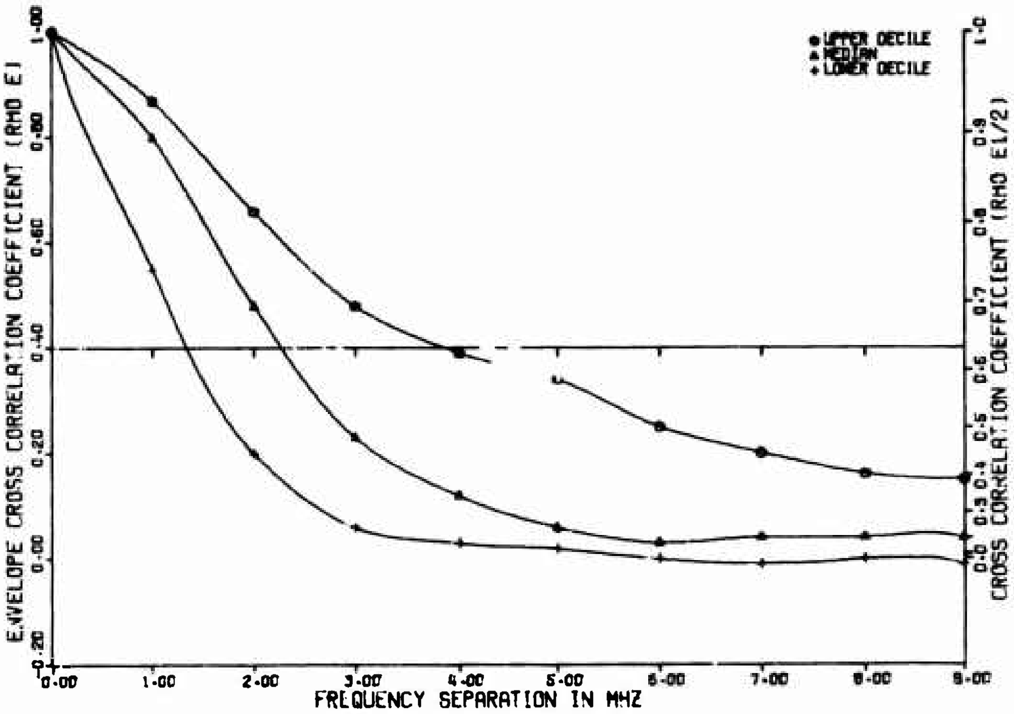


ENVELOPE CROSS CORRELATION COEFFICIENTS

PORT BYRON, FEBRUARY, X-BAND

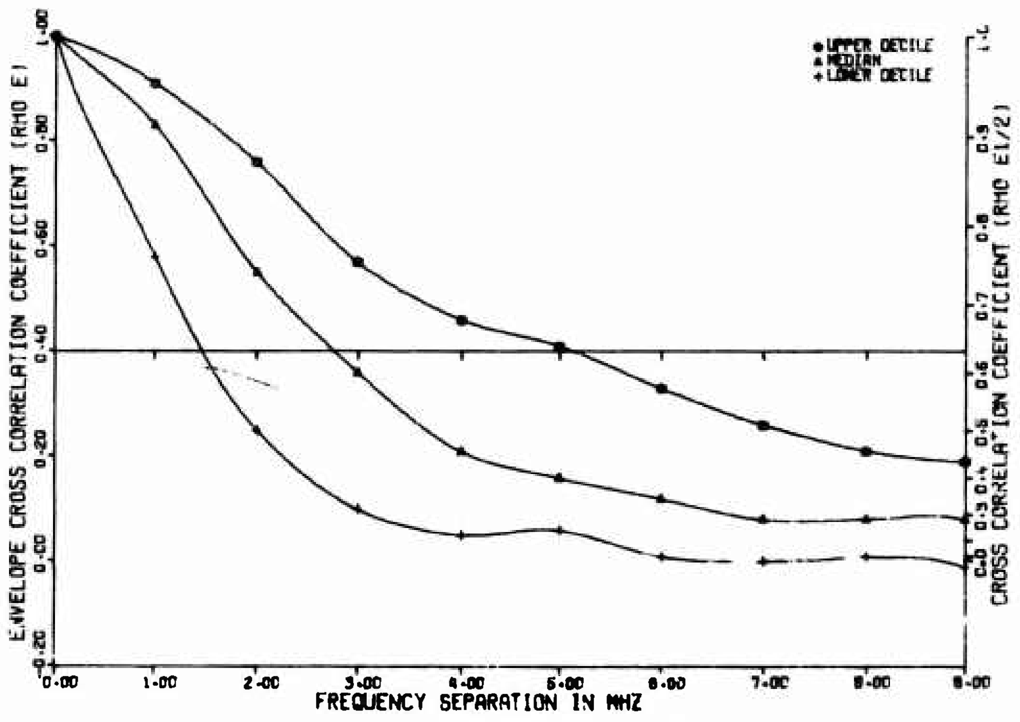
TEMPERATURE NOT OVER 33 DEGREES F., 32 TESTS

Figure 125.



ENVELOPE CROSS CORRELATION COEFFICIENTS
PORT BYRON, FEBRUARY, C-BAND
TEMPERATURE OVER 33 DEGREES F., 56 TESTS

Figure 126.



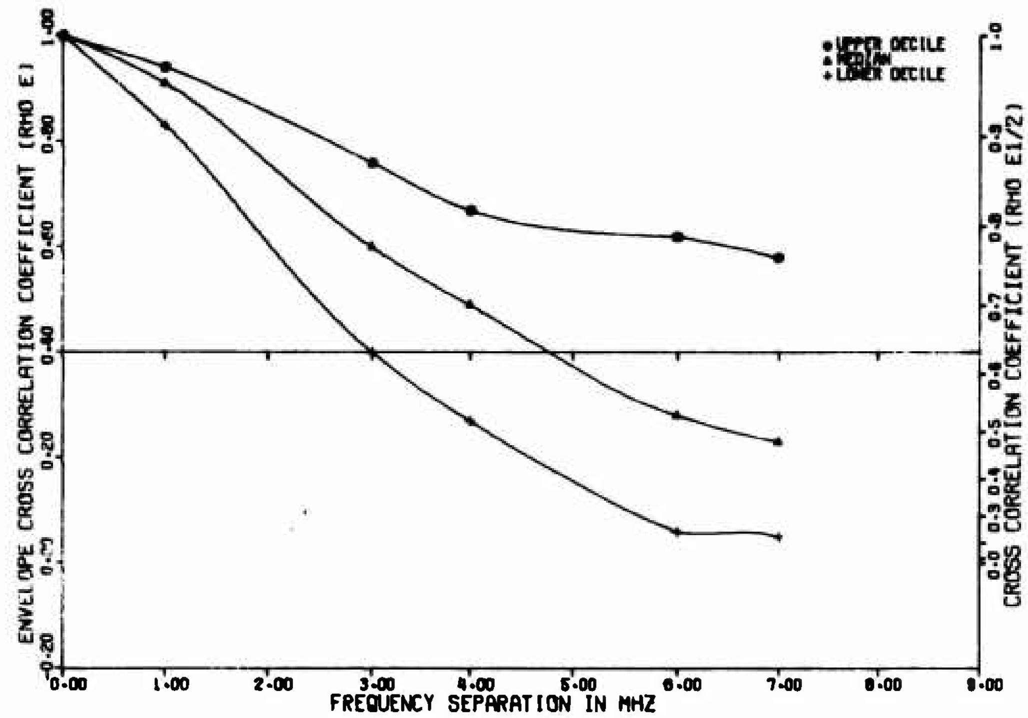
ENVELOPE CROSS CORRELATION COEFFICIENTS
PORT BYRON, FEBRUARY, C-BAND
TEMPERATURE NOT OVER 33 DEGREES F., 38 TESTS

Figure 127.

4. Correlation Bandwidth-Diurnal Effects

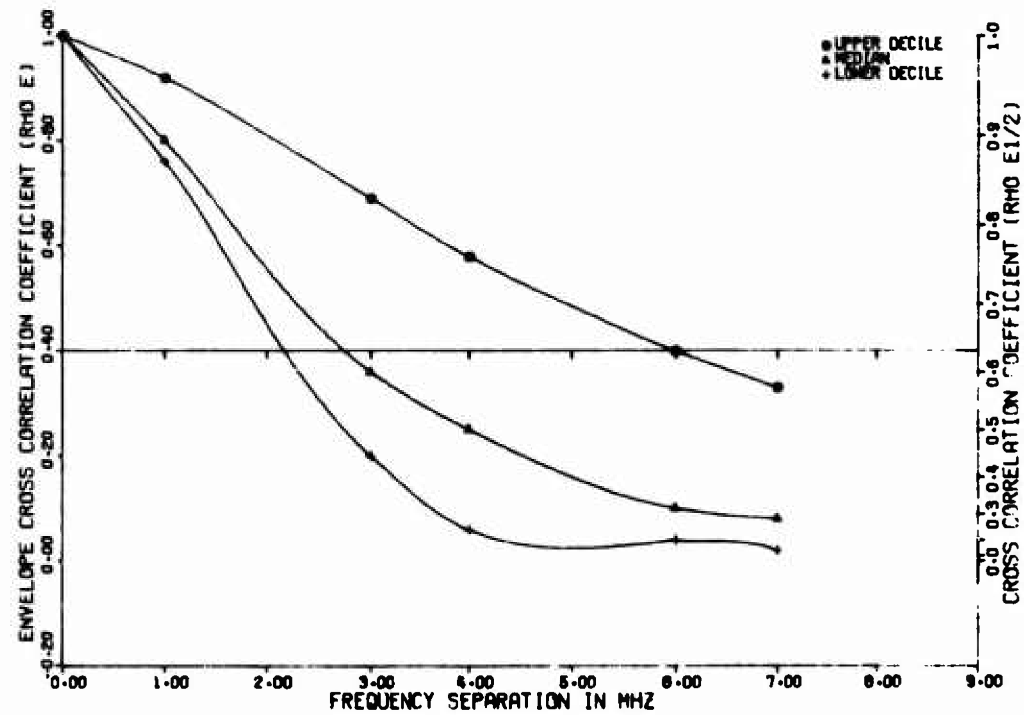
In a format similar to subsection VI-A-2, Figures 128 through 177 give the observed correlation distributions, but subdivided into data for four 6 hour periods through the day. These are 0001-0600, 0601-1200, 1201-1800, and 1801-2400 as shown in the figures. For several of the season-site-frequency band-diurnal period combinations there was either no or insufficient data to plot medians. For others there was too little data to allow a plot of the lower and upper deciles.

The most notable feature of these plots is the lack of any systematic variation with time of day. Almost any stated tendency can be refuted by several counter examples. One exception lies with the overwater Point Petre path where in general, at both X- and C-bands, the morning or early morning correlation bandwidths were slightly greater than those observed in the afternoon or evening.



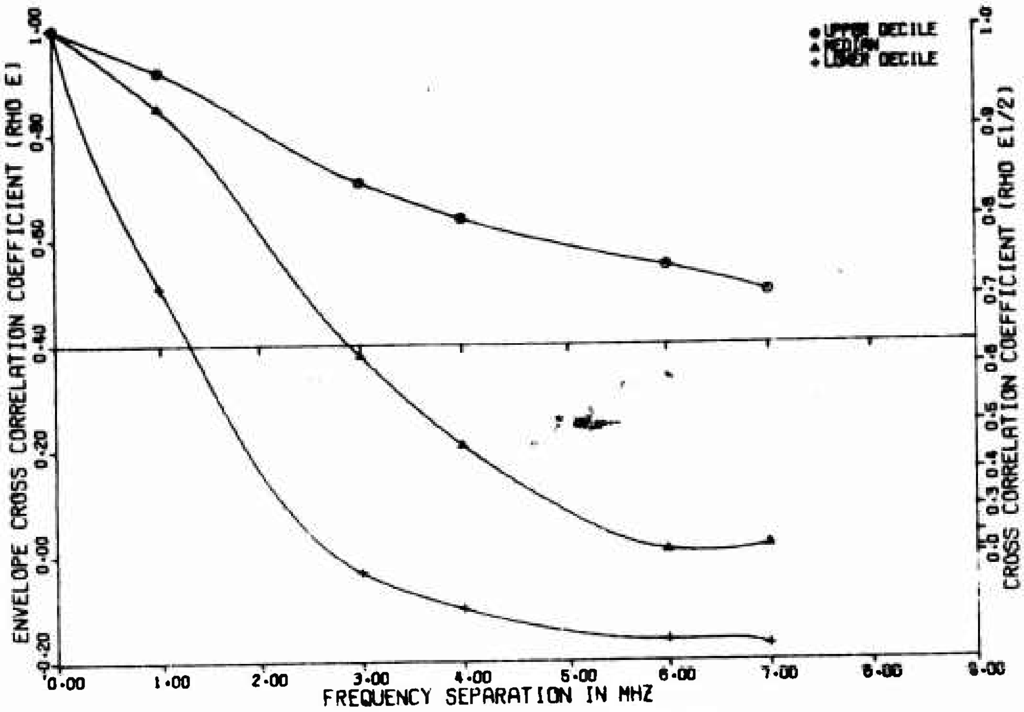
ENVELOPE CROSS CORRELATION COEFFICIENTS
ONTARIO CENTER, SUMMER, X-BAND
FROM 0801 TO 1200, 20 TESTS

Figure 128.



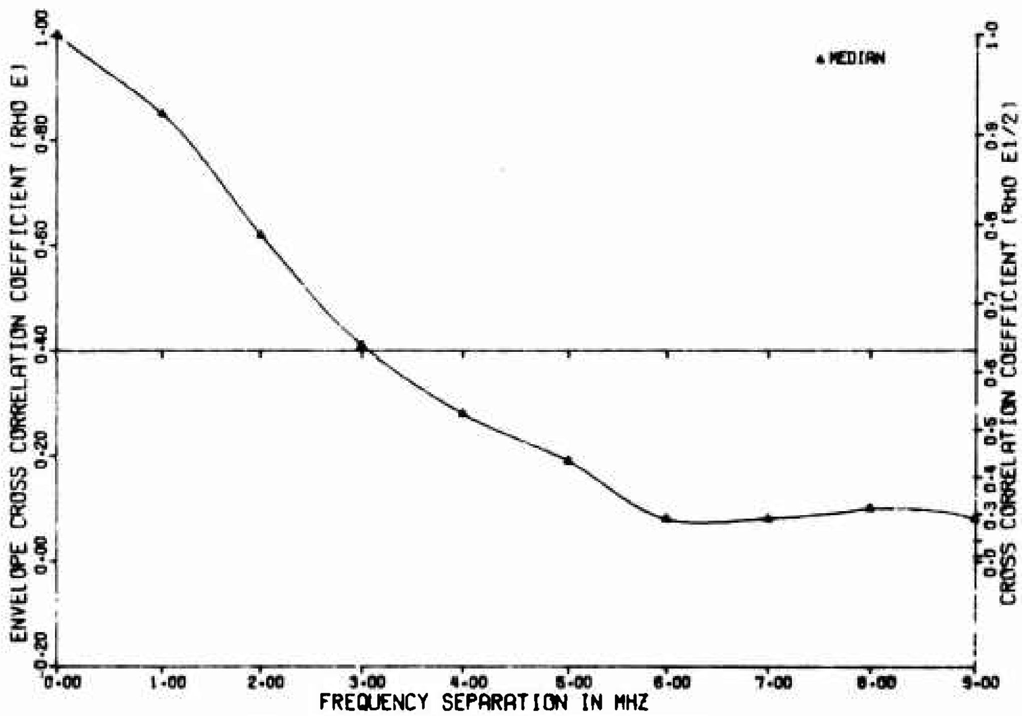
ENVELOPE CROSS CORRELATION COEFFICIENTS
ONTARIO CENTER, SUMMER, X-BAND
FROM 1201 TO 1800, 34 TESTS

Figure 129.



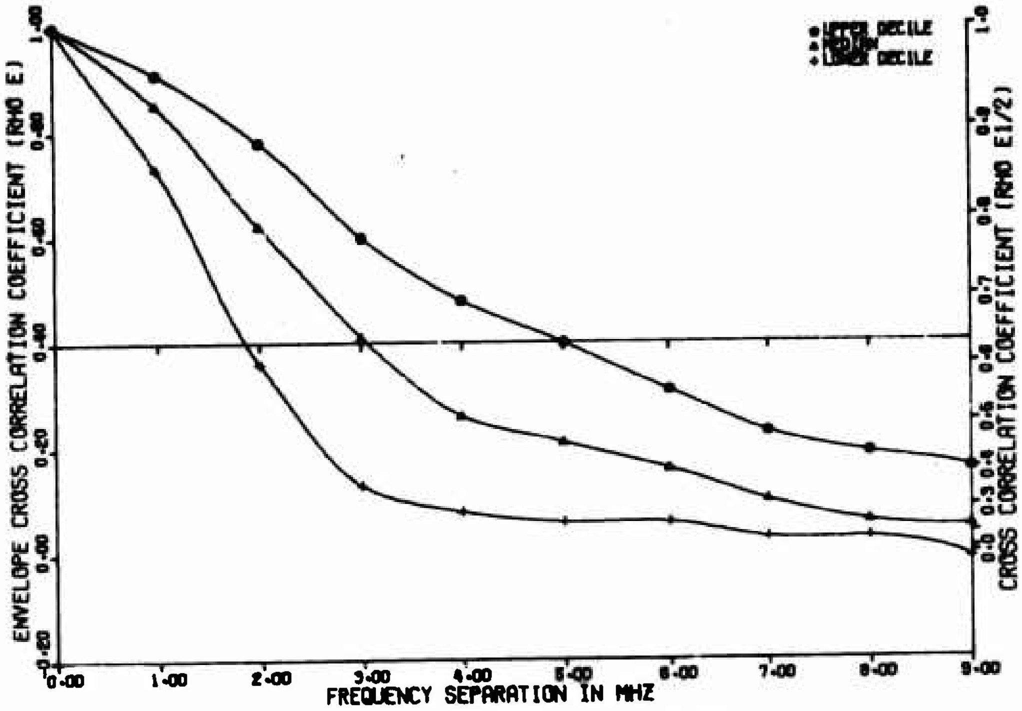
ENVELOPE CROSS CORRELATION COEFFICIENTS
ONTARIO CENTER, SUMMER, X-BAND
FROM 1801 TO 2400, 27 TESTS

Figure 130.



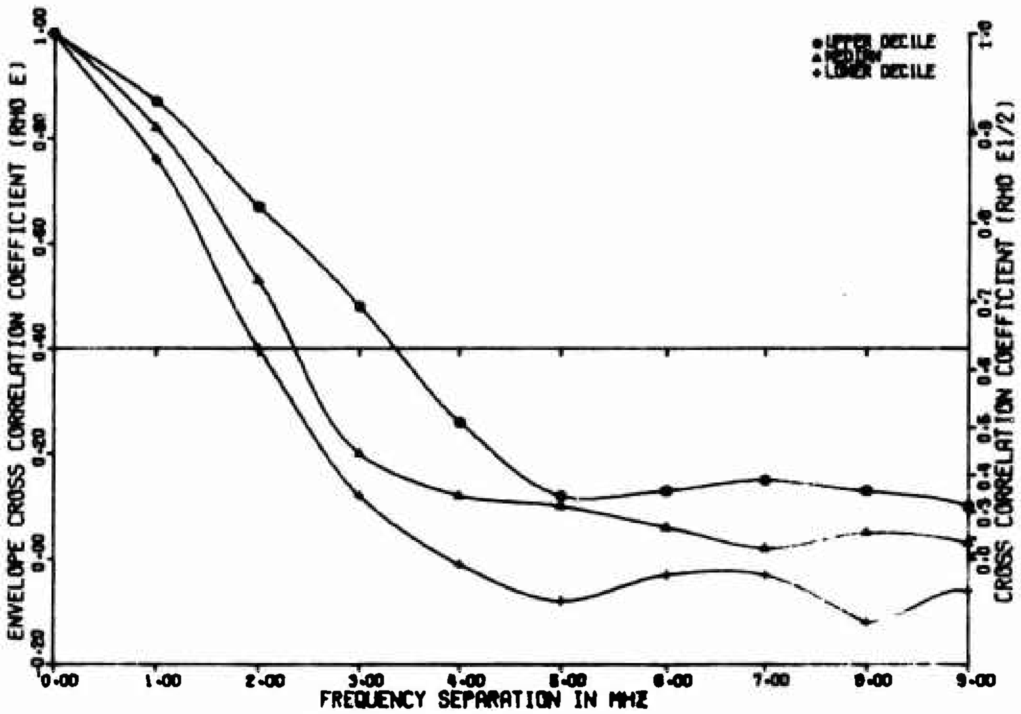
ENVELOPE CROSS CORRELATION COEFFICIENTS
ONTARIO CENTER, SUMMER, C-BAND
FROM 0601 TO 1200, 8 TESTS

Figure 131.



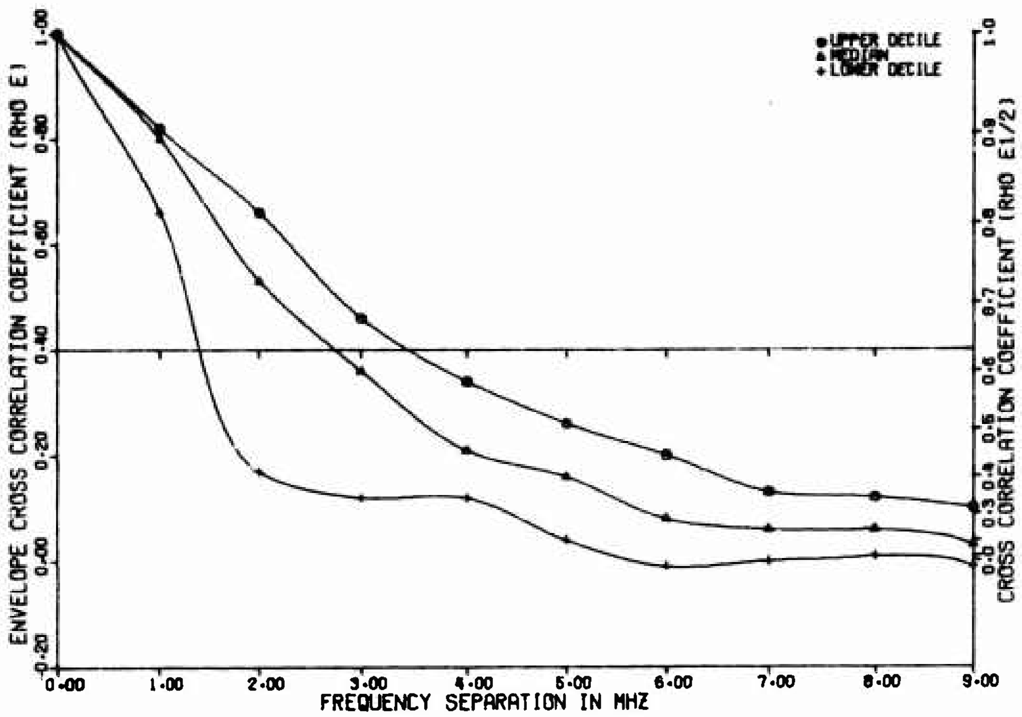
ENVELOPE CROSS CORRELATION COEFFICIENTS
ONTARIO CENTER, SUMMER, C-BAND
FROM 1201 TO 1800, 21 TESTS

Figure 132.



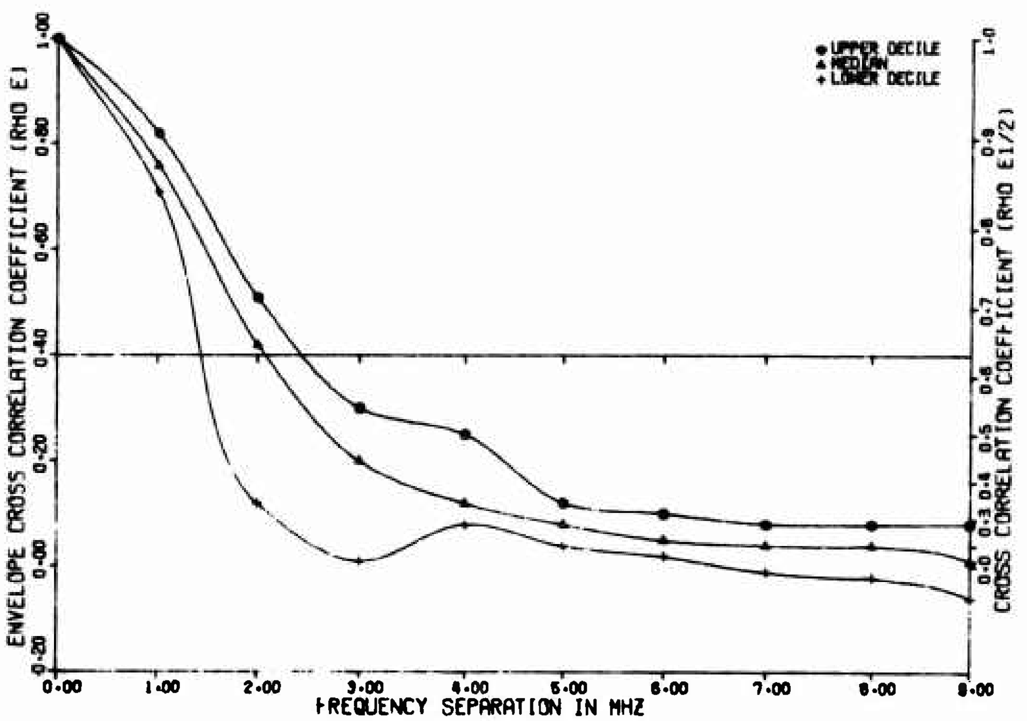
ENVELOPE CROSS CORRELATION COEFFICIENTS
ONTARIO CENTER, SUMMER, C-BAND
FROM 1801 TO 2400, 18 TESTS

Figure 133.



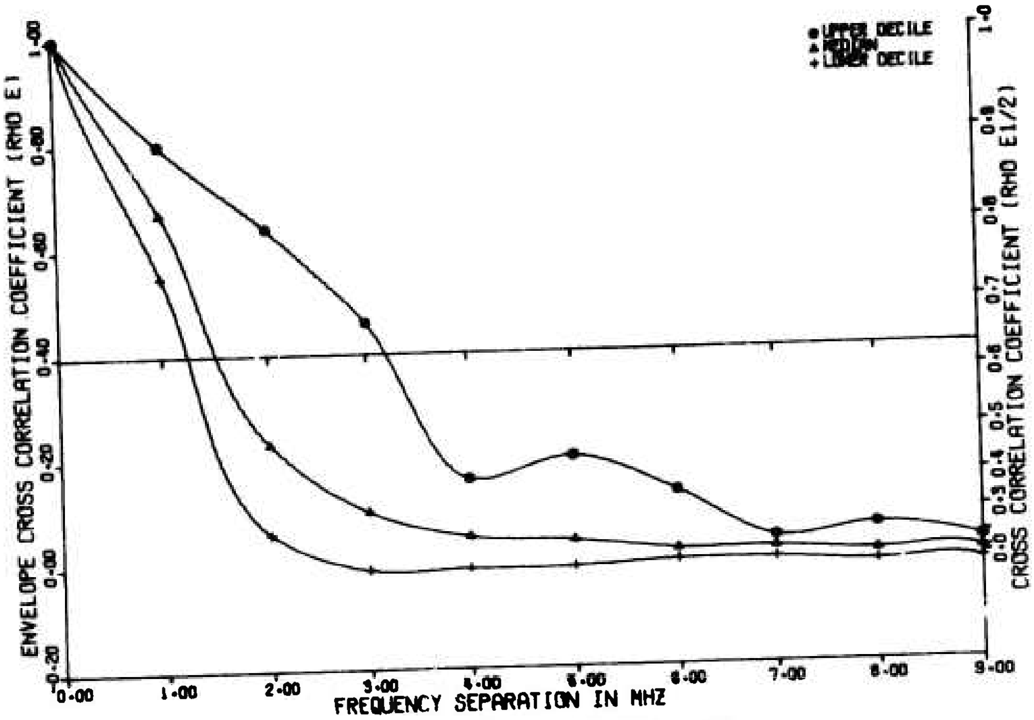
ENVELOPE CROSS CORRELATION COEFFICIENTS
WHITFORD FIELD, SUMMER, X-BAND
FROM 1201 TO 1800, 17 TESTS

Figure 134.



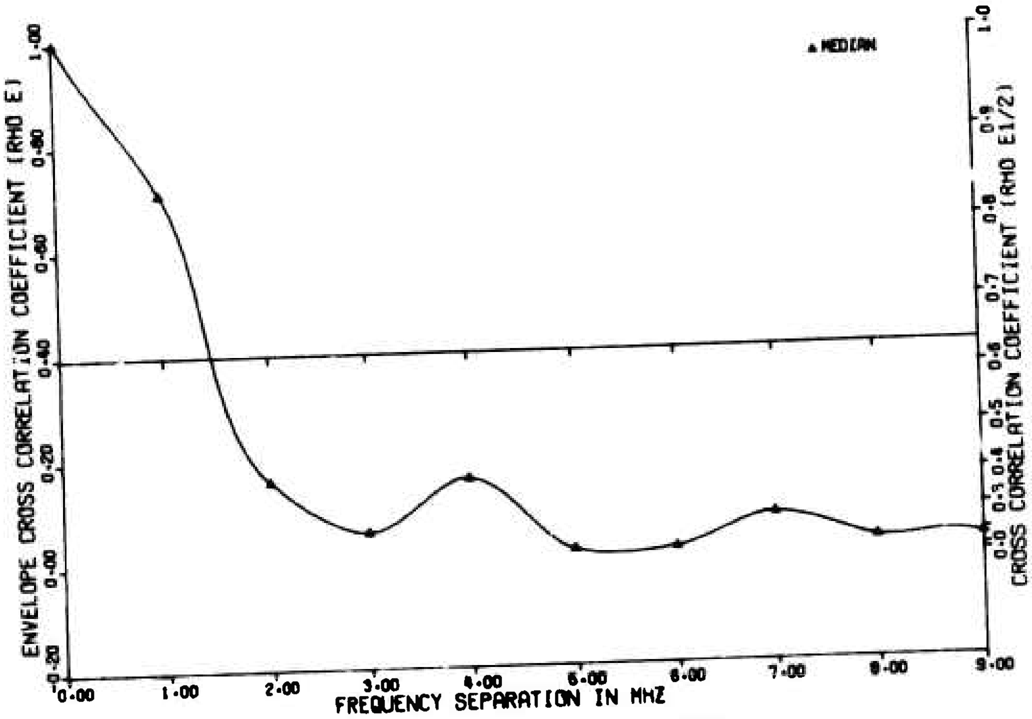
ENVELOPE CROSS CORRELATION COEFFICIENTS
WHITFORD FIELD, SUMMER, C-BAND
FROM 0601 TO 1200, 15 TESTS

Figure 135.



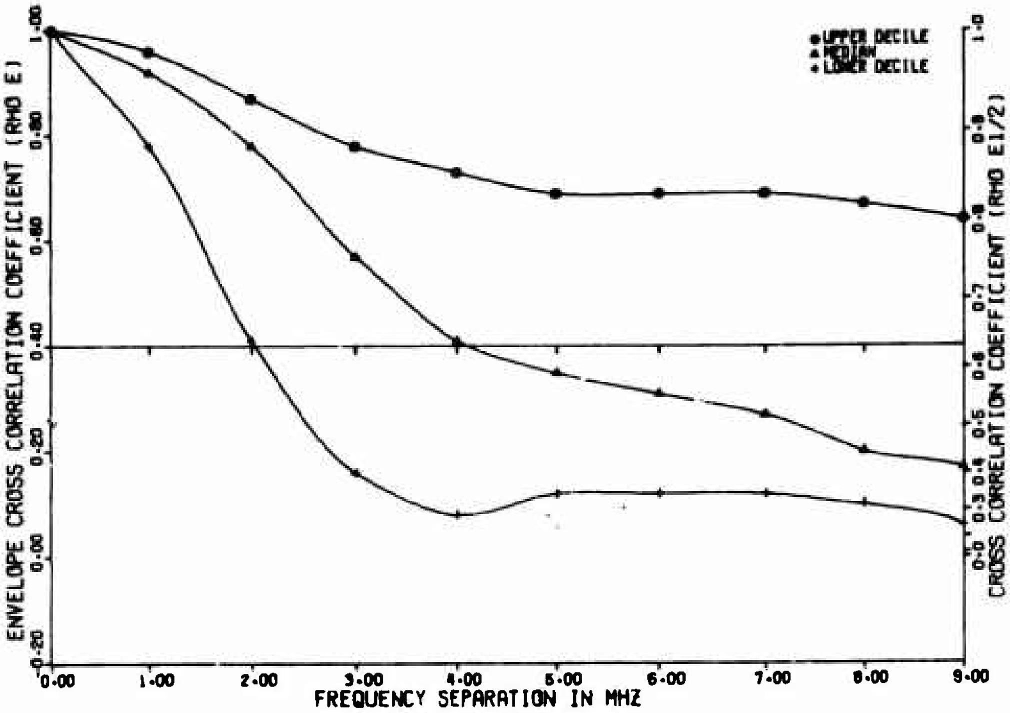
ENVELOPE CROSS CORRELATION COEFFICIENTS
WHITFORD FIELD, SUMMER, C-BAND
FROM 1201 TO 1800, 29 TESTS

Figure 136.



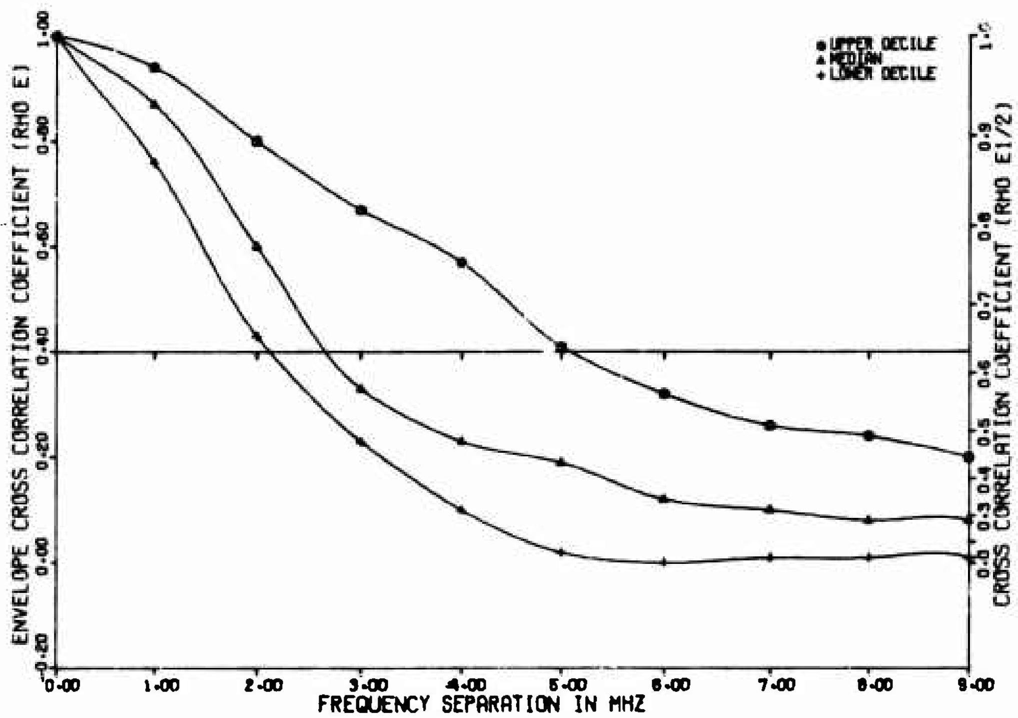
ENVELOPE CROSS CORRELATION COEFFICIENTS
WHITFORD FIELD, SUMMER, C-BAND
FROM 1801 TO 2400, 5 TESTS

Figure 137.



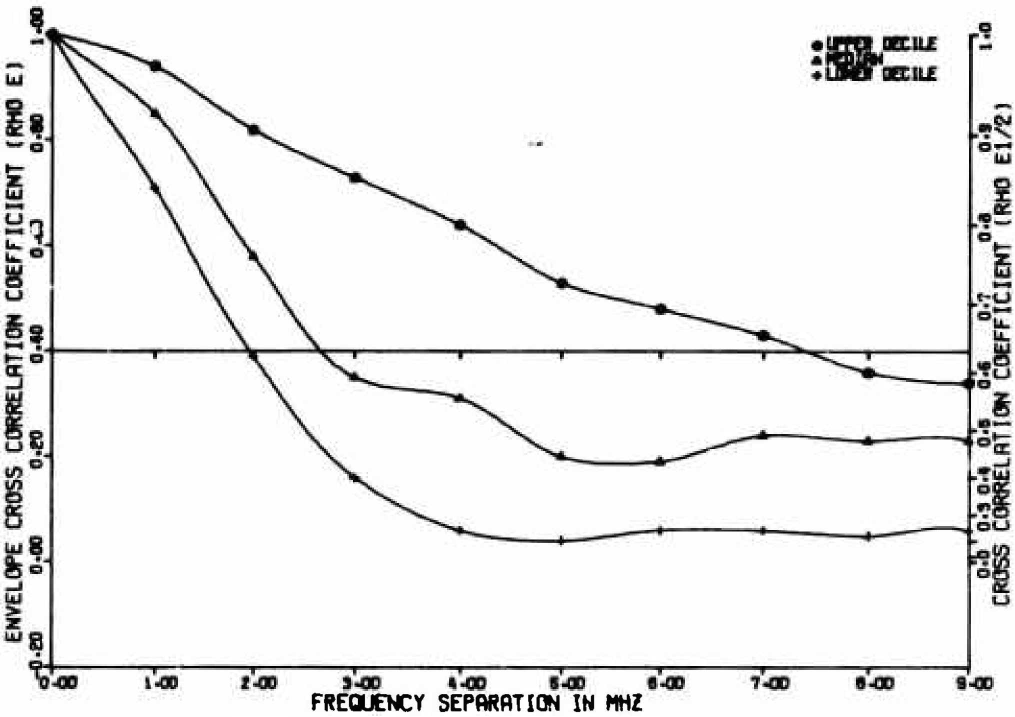
ENVELOPE CROSS CORRELATION COEFFICIENTS
POINT PETRE, SEPTEMBER, X-BAND
FROM 0001 TO 0800, 15 TESTS

Figure 138.



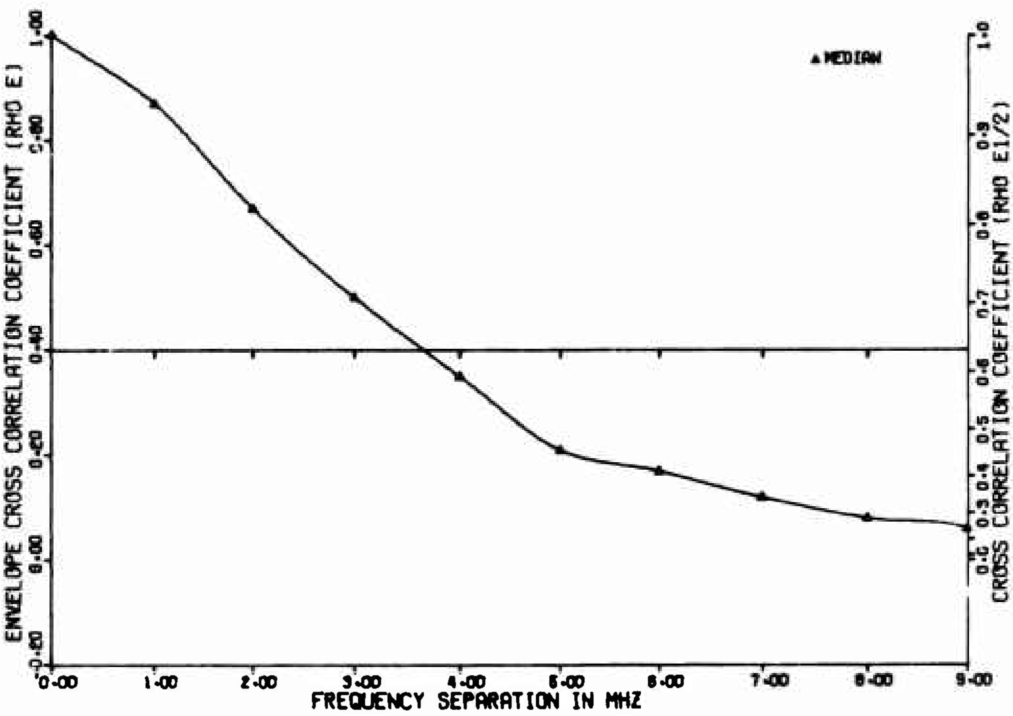
ENVELOPE CROSS CORRELATION COEFFICIENTS
POINT PETRE, SEPTEMBER, X-BAND
FROM 0801 TO 1200, 32 TESTS

Figure 139.



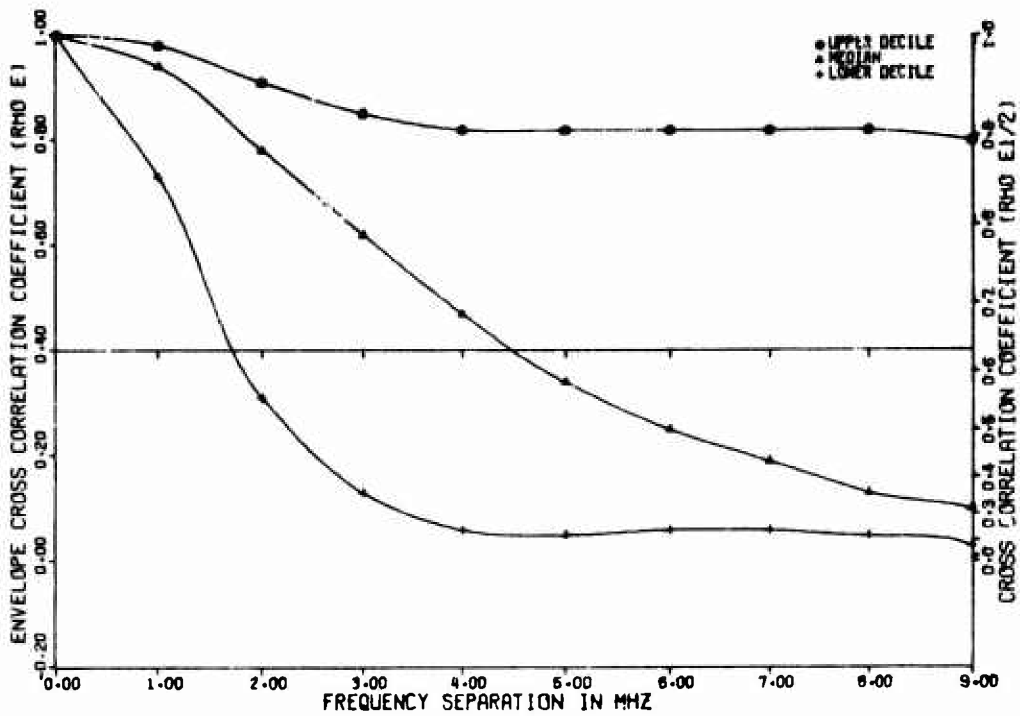
ENVELOPE CROSS CORRELATION COEFFICIENTS
POINT PETRE, SEPTEMBER, X-BAND
FROM 1201 TO 1800, 25 TESTS

Figure 140.



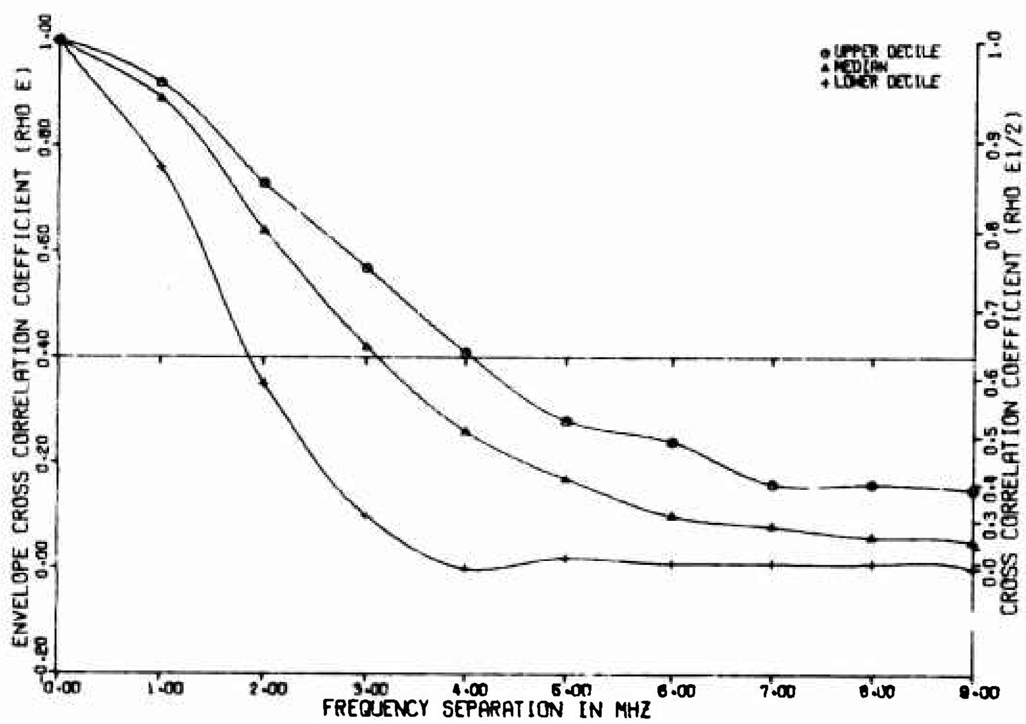
ENVELOPE CROSS CORRELATION COEFFICIENTS
POINT PETRE, SEPTEMBER, X-BAND
FROM 1801 TO 2400, 9 TESTS

Figure 141.



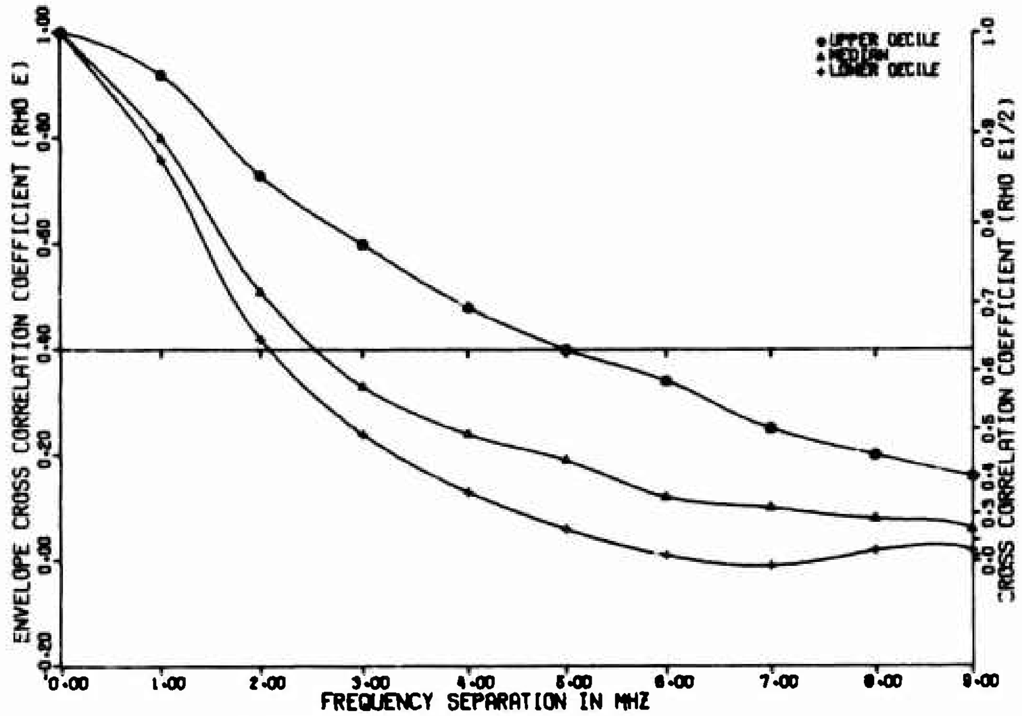
ENVELOPE CROSS CORRELATION COEFFICIENTS
POINT PETRE, SEPTEMBER, C-BAND
FROM 0001 TO 0600, 12 TESTS

Figure 142.



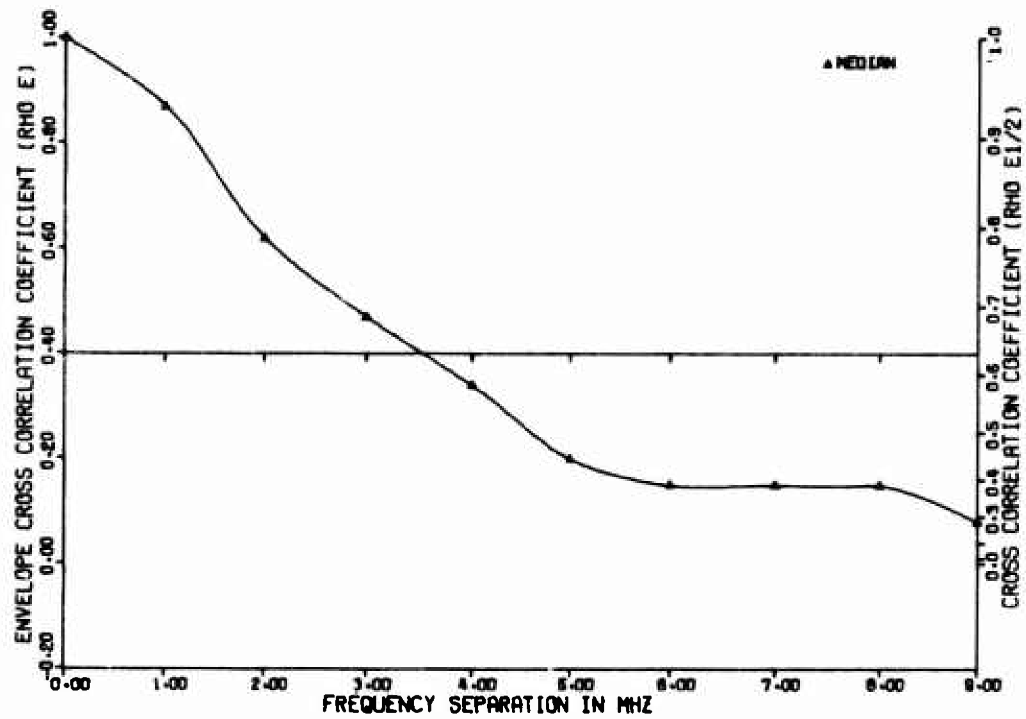
ENVELOPE CROSS CORRELATION COEFFICIENTS
POINT PETRE, SEPTEMBER, C-BAND
FROM 0601 TO 1200, 38 TESTS

Figure 143.



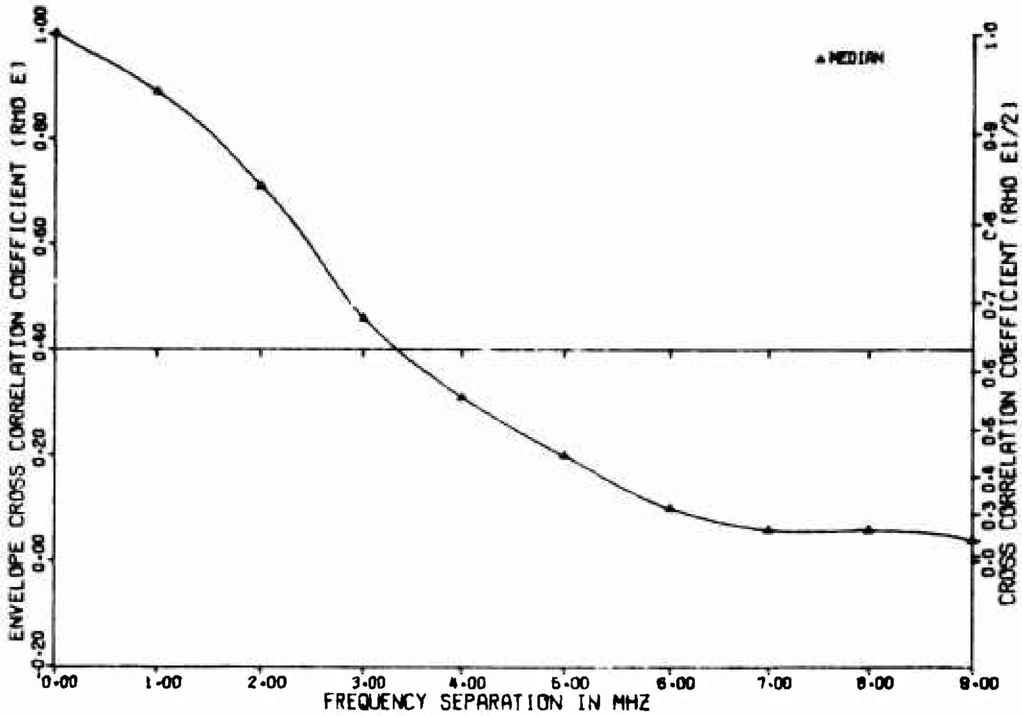
ENVELOPE CROSS CORRELATION COEFFICIENTS
POINT PETRE, SEPTEMBER, C-BAND
FROM 1201 TO 1800, 30 TESTS

Figure 144.



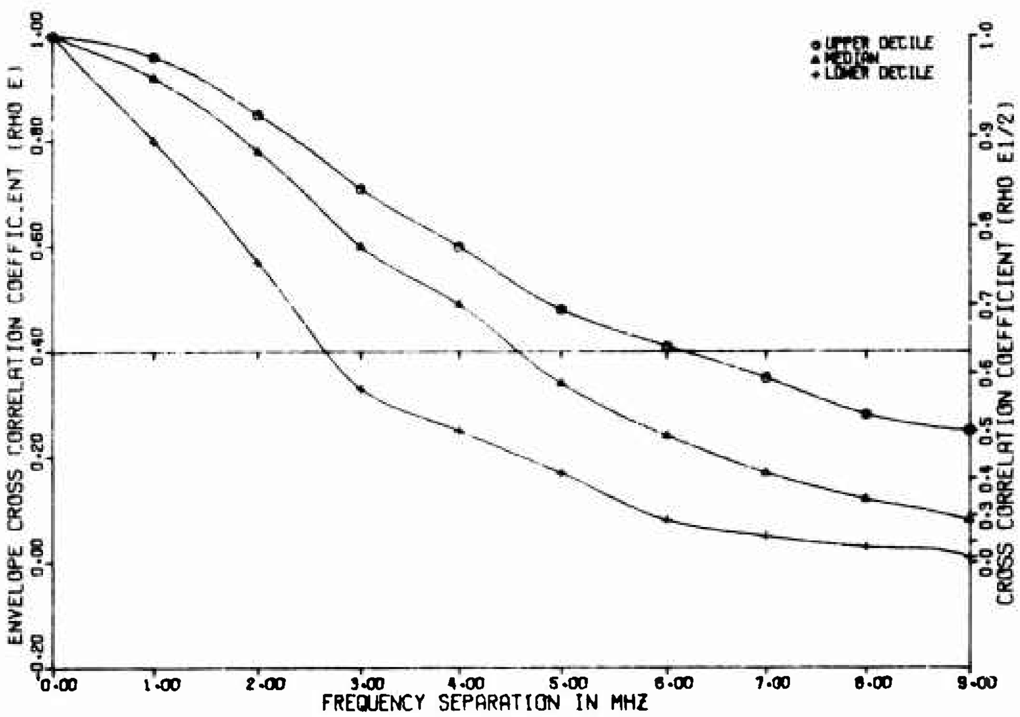
ENVELOPE CROSS CORRELATION COEFFICIENTS
POINT PETRE, SEPTEMBER, C-BAND
FROM 1801 TO 2400, 8 TESTS

Figure 145.



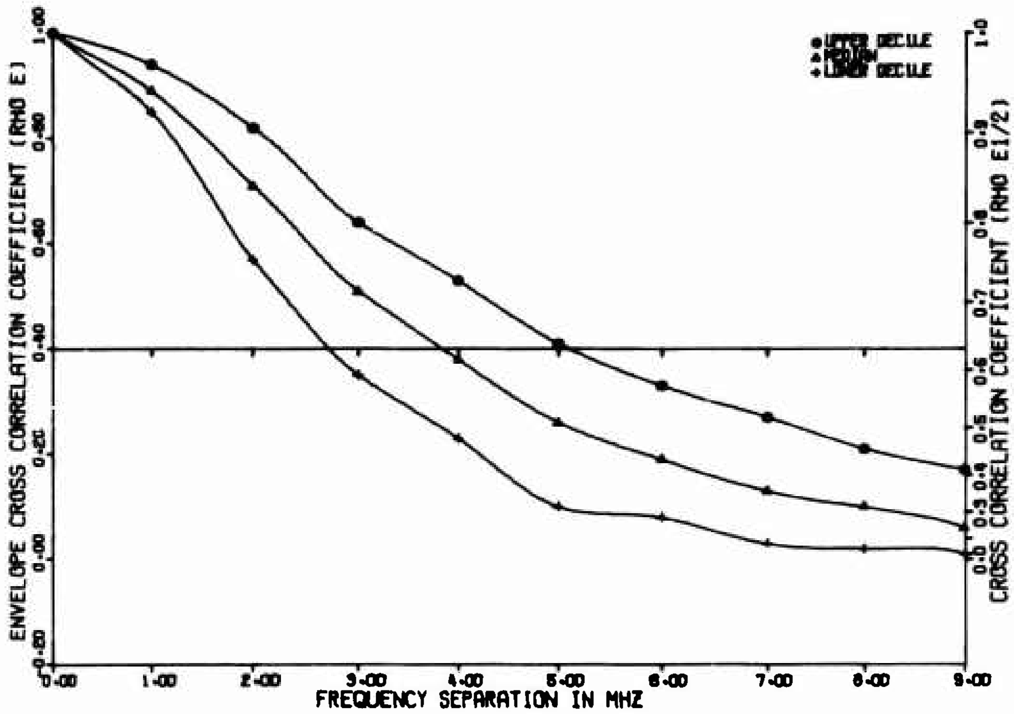
ENVELOPE CROSS CORRELATION COEFFICIENTS
ONTARIO CENTER, OCTOBER X-BAND
FROM 0001 TO 0600, 4 TESTS

Figure 146.



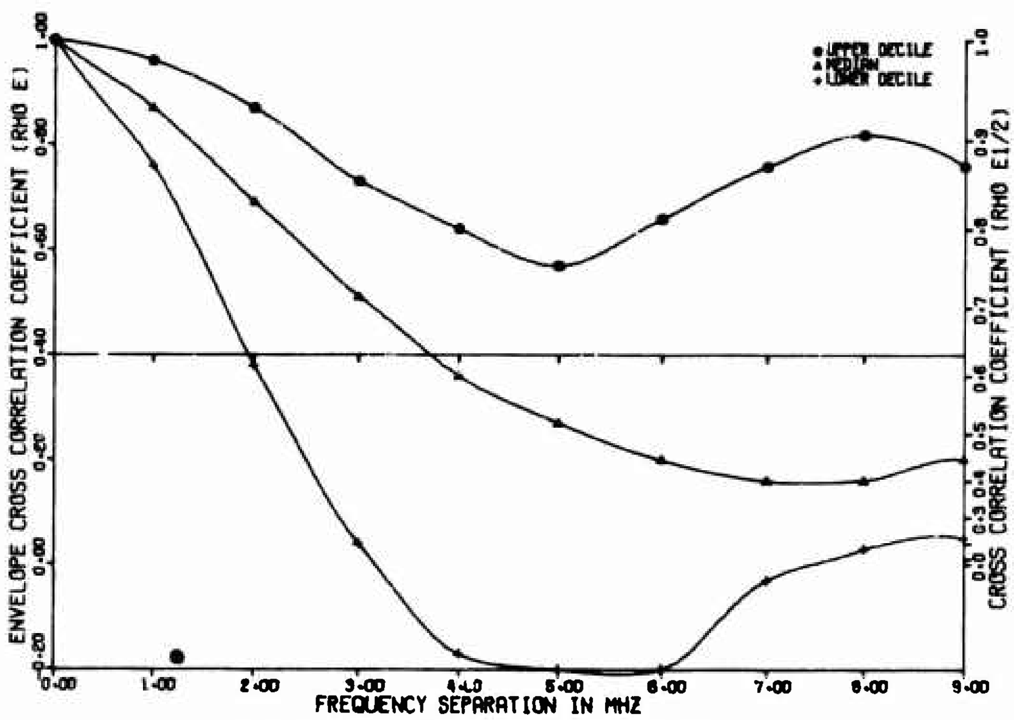
ENVELOPE CROSS CORRELATION COEFFICIENTS
ONTARIO CENTER, OCTOBER, X-BAND
FROM 0801 TO 1200, 27 TESTS

Figure 147.



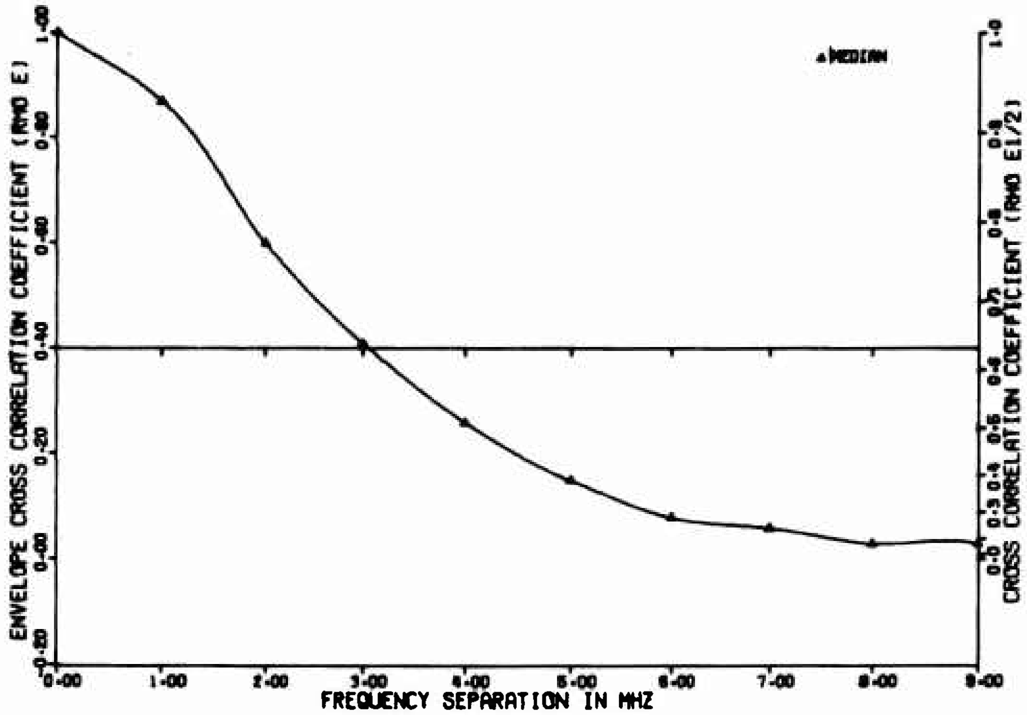
ENVELOPE CROSS CORRELATION COEFFICIENTS
ONTARIO CENTER, OCTOBER, X-BAND
FROM 1201 TO 1800, 55 TESTS

Figure 148.



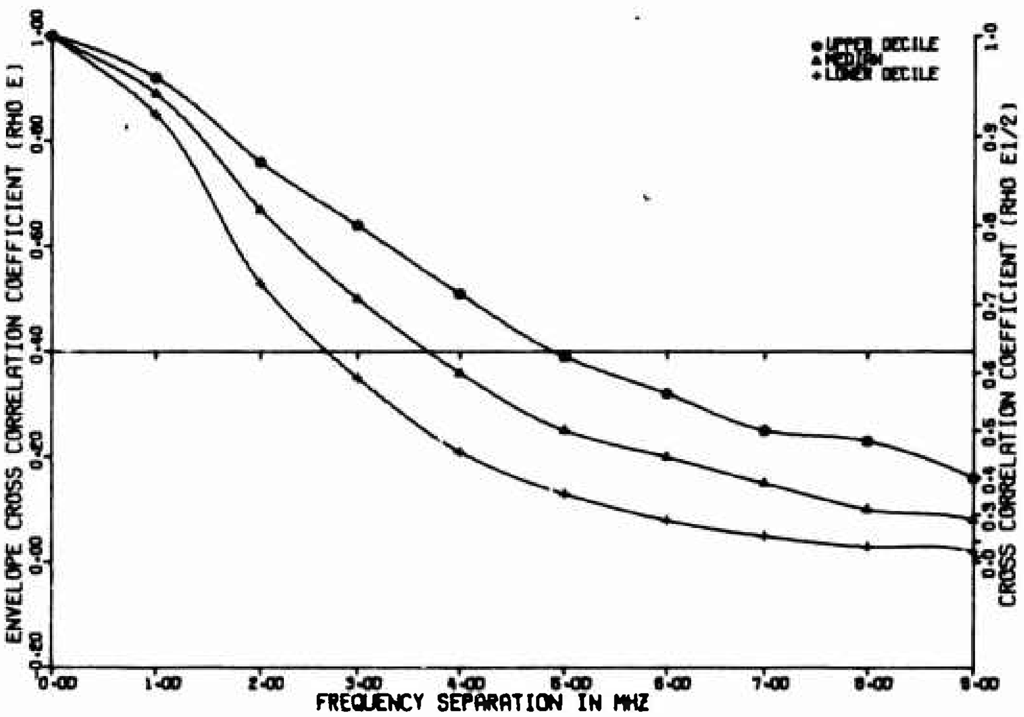
ENVELOPE CROSS CORRELATION COEFFICIENTS
ONTARIO CENTER, OCTOBER, X-BAND
FROM 1801 TO 2400, 23 TESTS

Figure 149.



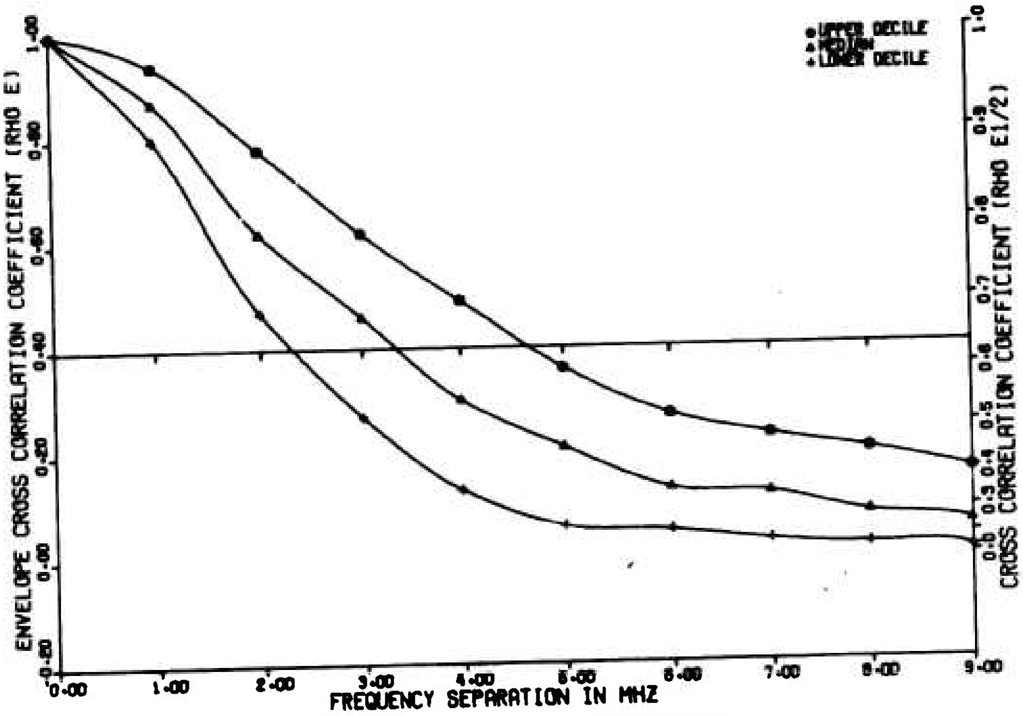
ENVELOPE CROSS CORRELATION COEFFICIENTS
ONTARIO CENTER, OCTOBER C-BAND
FROM 0001 TO 0800, 4 TESTS

Figure 150.



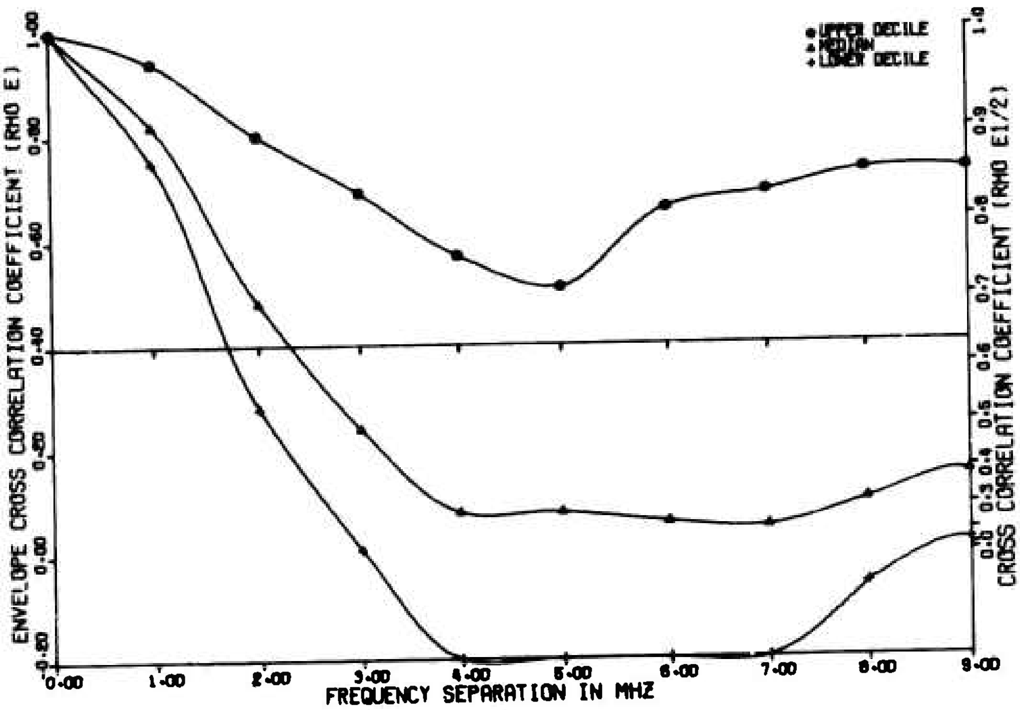
ENVELOPE CROSS CORRELATION COEFFICIENTS
ONTARIO CENTER, OCTOBER, C-BAND
FROM 0801 TO 1200, 31 TESTS

Figure 151.



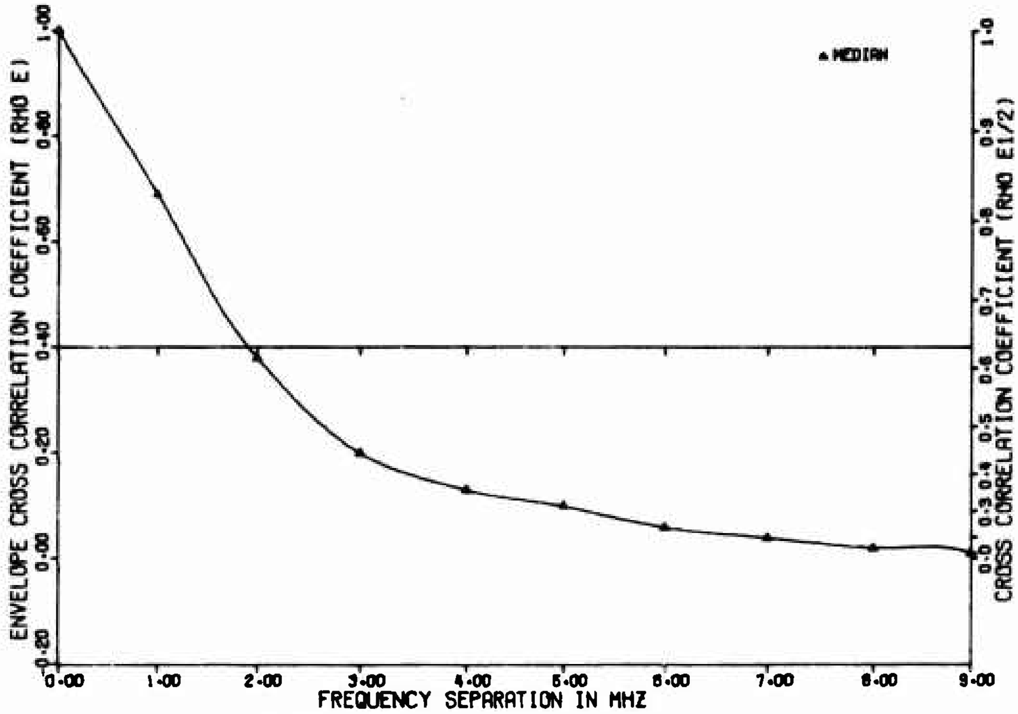
ENVELOPE CROSS CORRELATION COEFFICIENTS
ONTARIO CENTER, OCTOBER, C-BAND
FROM 1201 TO 1800, 58 TESTS

Figure 152.



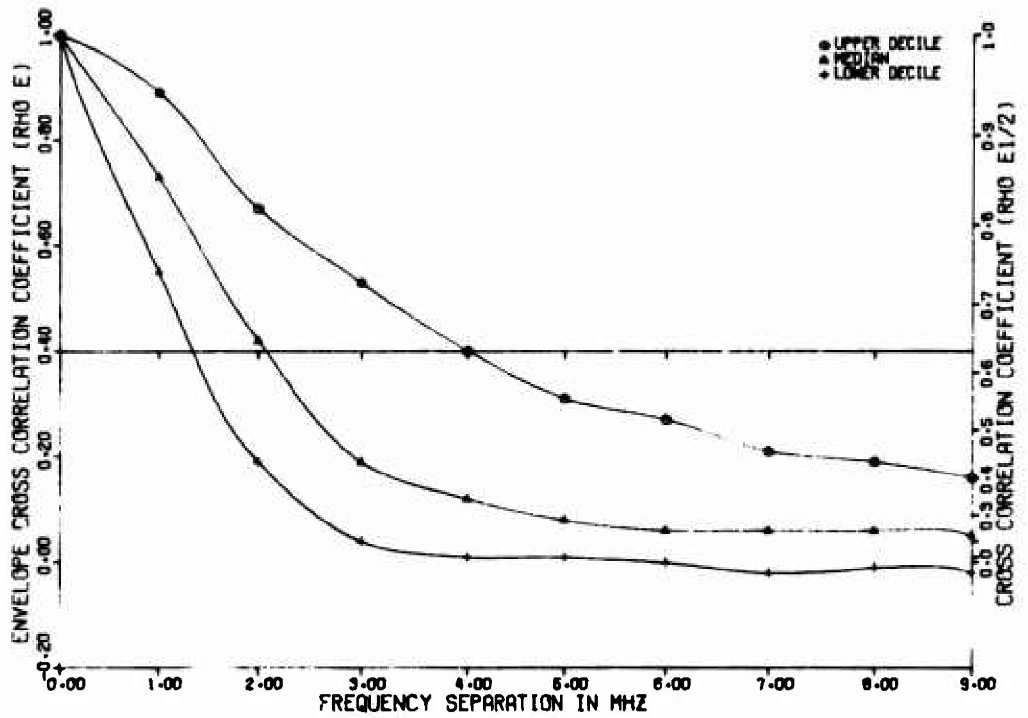
ENVELOPE CROSS CORRELATION COEFFICIENTS
ONTARIO CENTER, OCTOBER, C-BAND
FROM 1801 TO 2400, 22 TESTS

Figure 153.



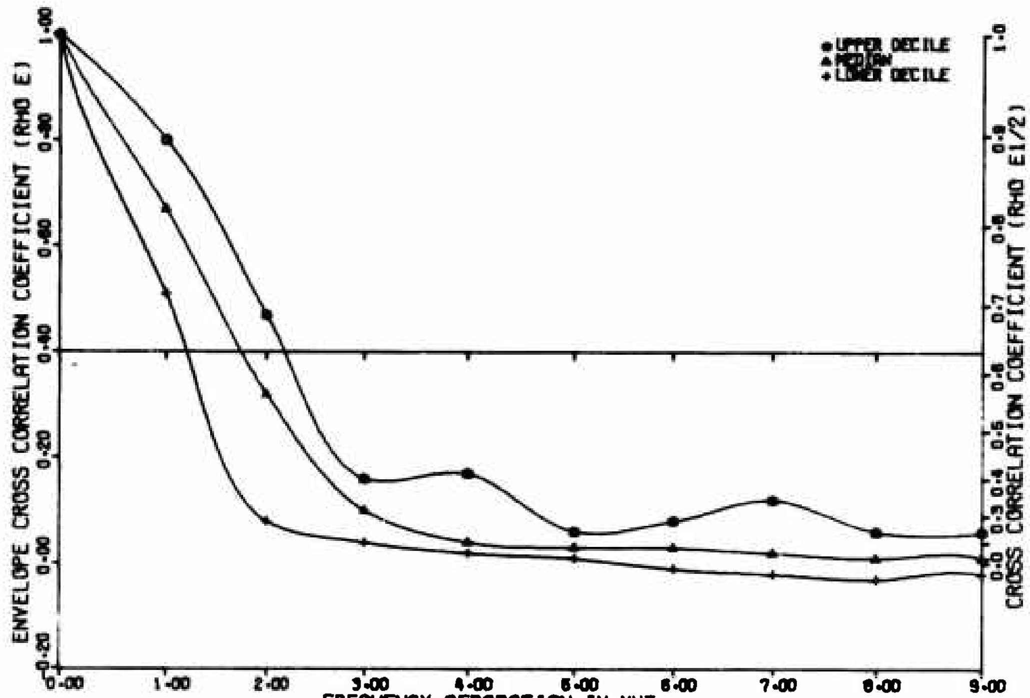
ENVELOPE CROSS CORRELATION COEFFICIENTS
WHITFORD FIELD, NOVEMBER, X-BAND
FROM 0601 TO 1200, 8 TESTS

Figure 154.



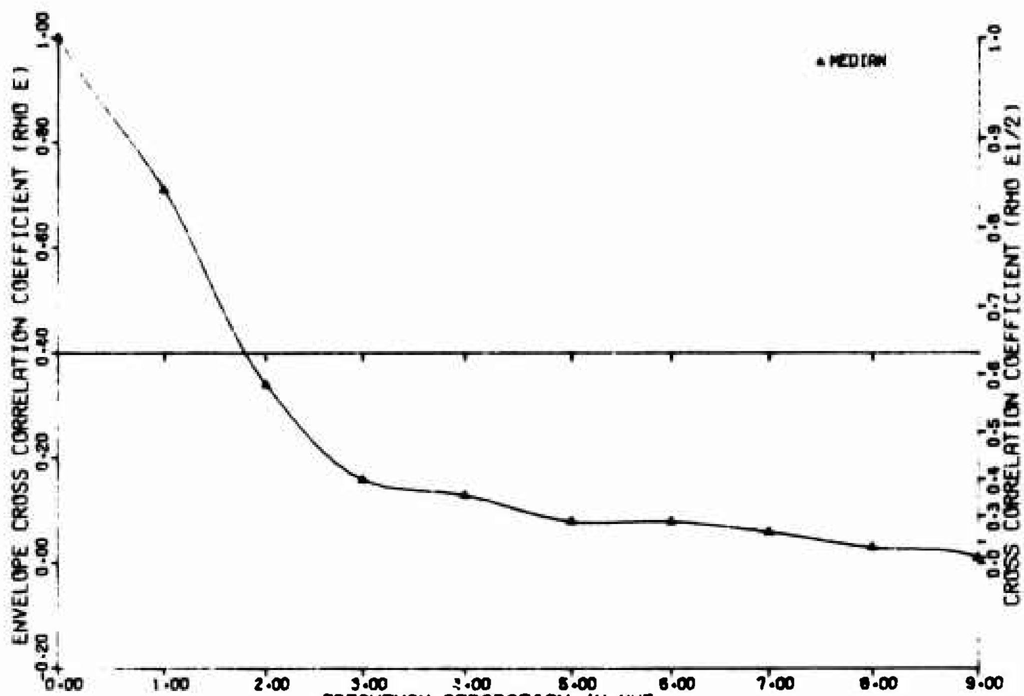
ENVELOPE CROSS CORRELATION COEFFICIENTS
WHITFORD FIELD, NOVEMBER, X-BAND
FROM 1201 TO 1800, 49 TESTS

Figure 155.



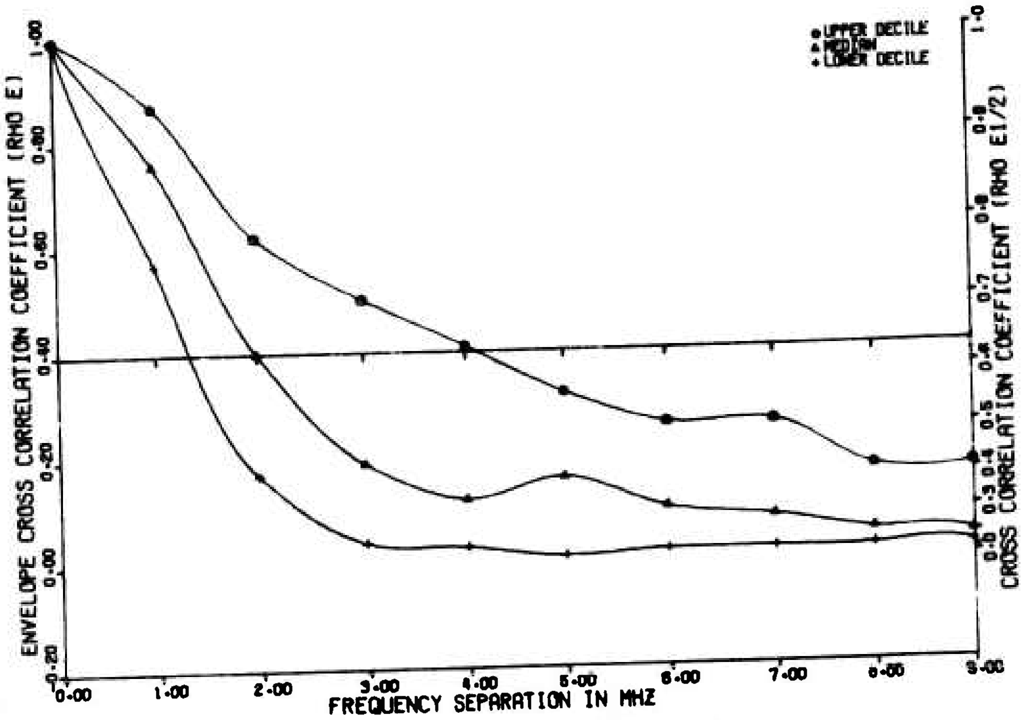
ENVELOPE CROSS CORRELATION COEFFICIENTS
WHITFORD FIELD, NOVEMBER, X-BAND
FROM 1801 TO 2400, 15 TESTS

Figure 156.



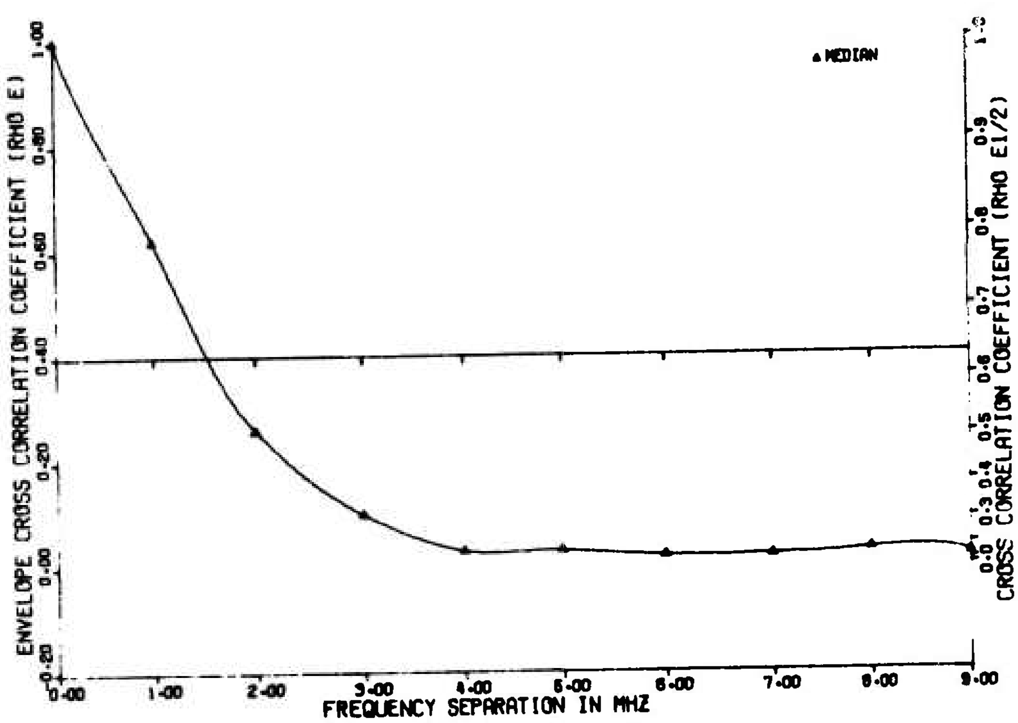
ENVELOPE CROSS CORRELATION COEFFICIENTS
WHITFORD FIELD, NOVEMBER, C-BAND
FROM 0801 TO 1200, 8 TESTS

Figure 157.



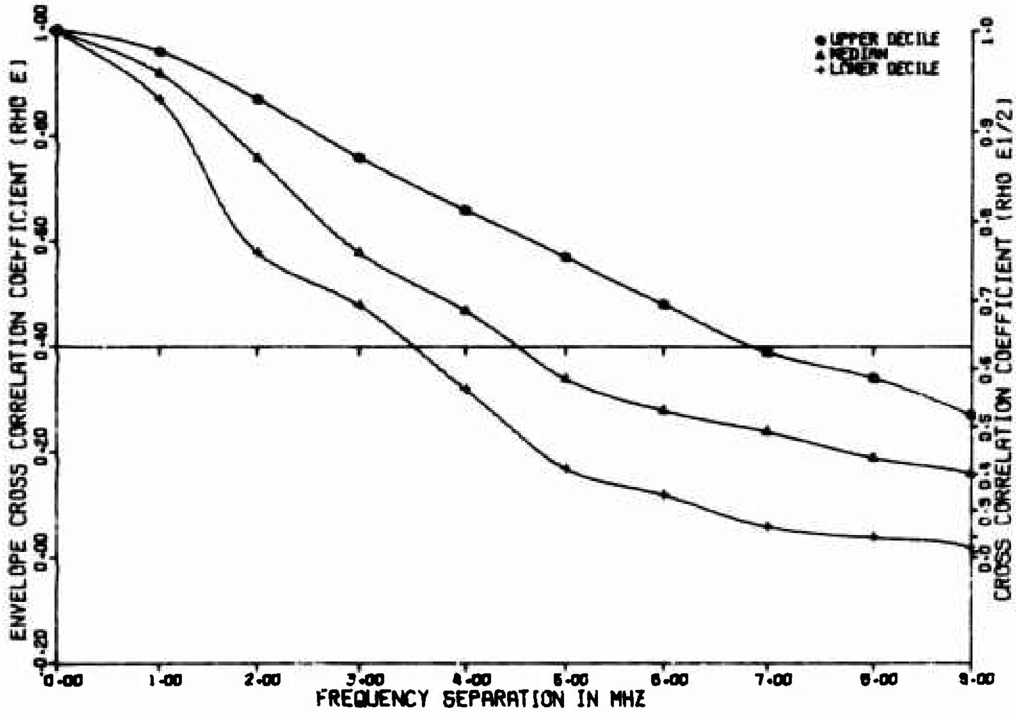
ENVELOPE CROSS CORRELATION COEFFICIENTS
WHITFORD FIELD, NOVEMBER, C-BAND
FROM 1201 TO 1800, 33 TESTS

Figure 158.



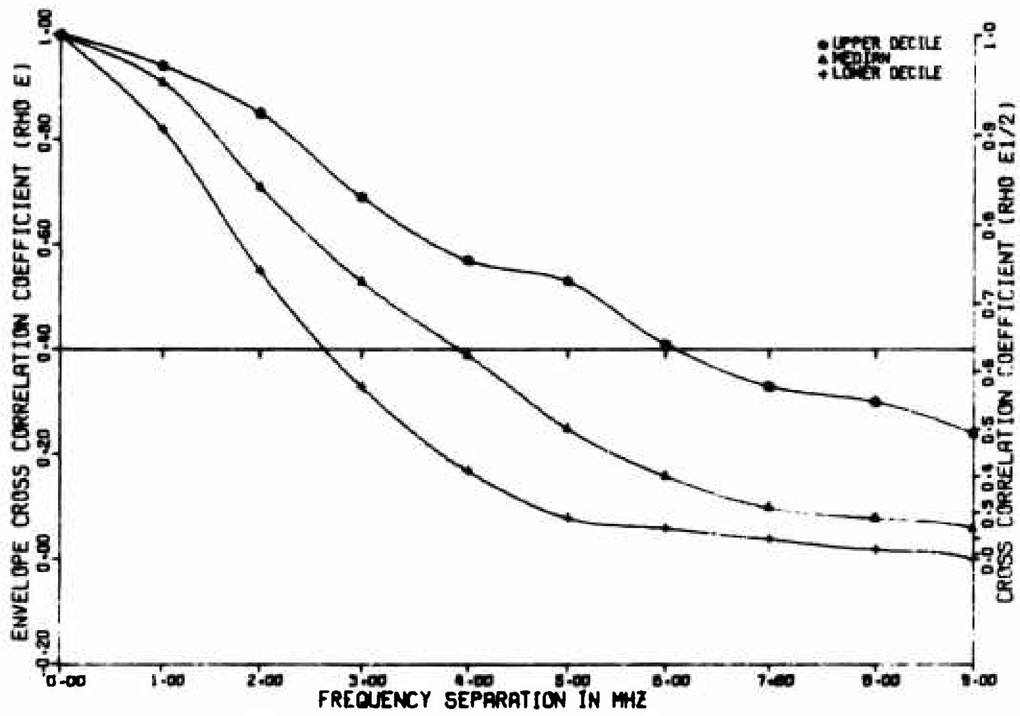
ENVELOPE CROSS CORRELATION COEFFICIENTS
WHITFORD FIELD, NOVEMBER, C-BAND
FROM 1801 TO 2400, 6 TESTS

Figure 159.



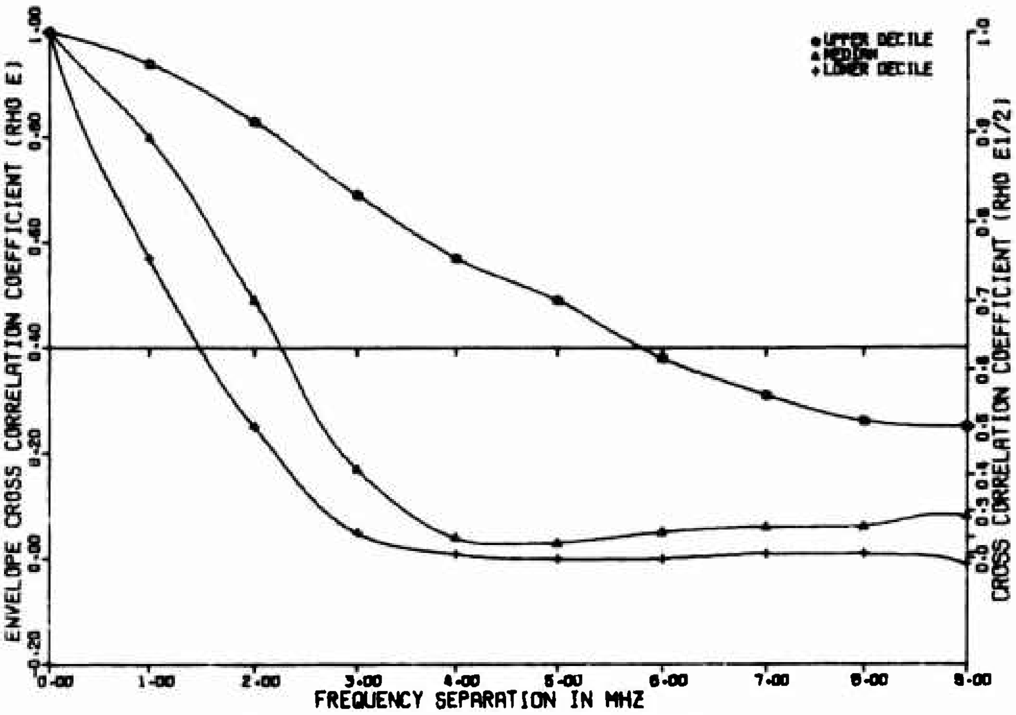
ENVELOPE CROSS CORRELATION COEFFICIENTS
POINT PETRE, WINTER, X-BAND
FROM 0601 TO 1200, 24 TESTS

Figure 160.



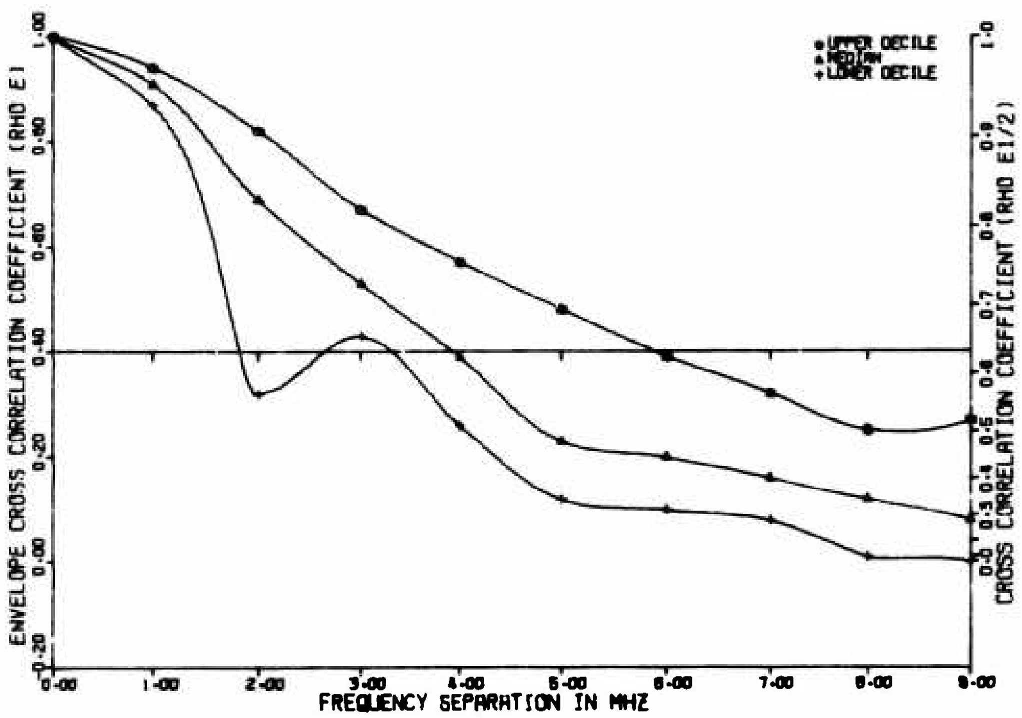
ENVELOPE CROSS CORRELATION COEFFICIENTS
POINT PETRE, WINTER, X-BAND
FROM 1201 TO 1800, 62 TESTS

Figure 161.



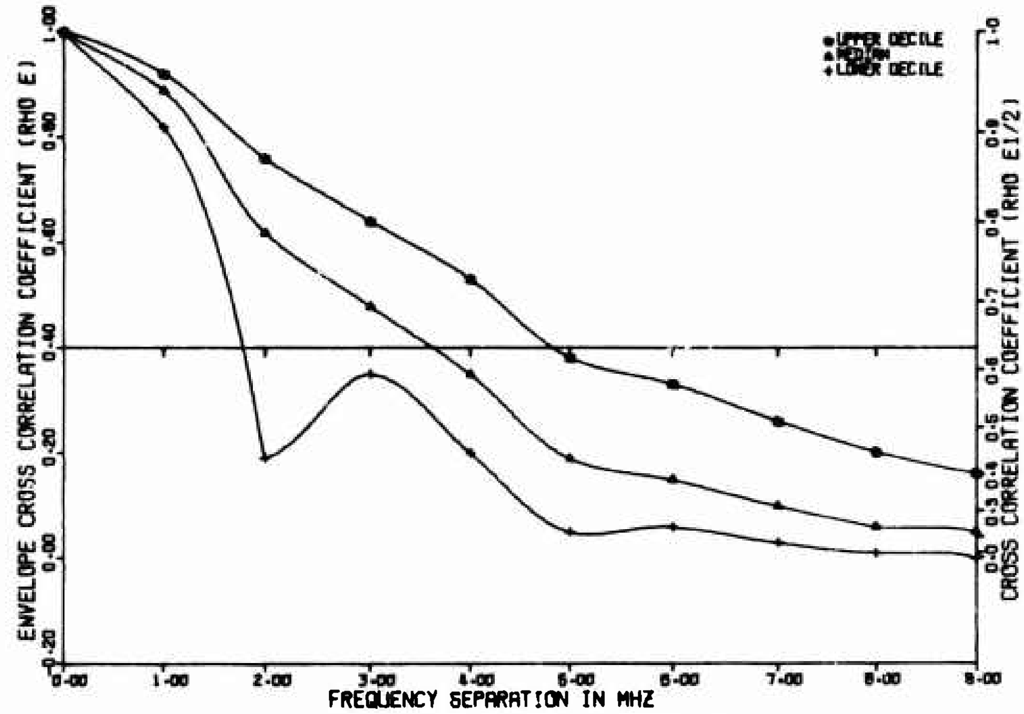
ENVELOPE CROSS CORRELATION COEFFICIENTS
POINT PETRE, WINTER, X-BAND
FROM 1801 TO 2400, 14 TESTS

Figure 162.



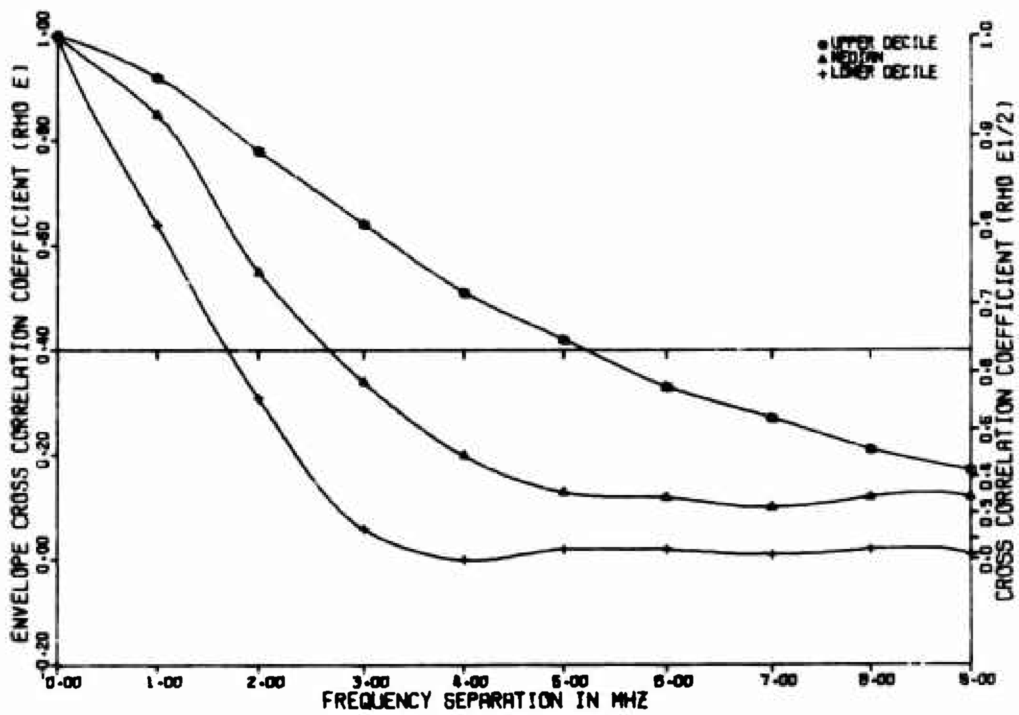
ENVELOPE CROSS CORRELATION COEFFICIENTS
POINT PETRE, WINTER, C-BAND
FROM 0801 TO 1200, 39 TESTS

Figure 163.



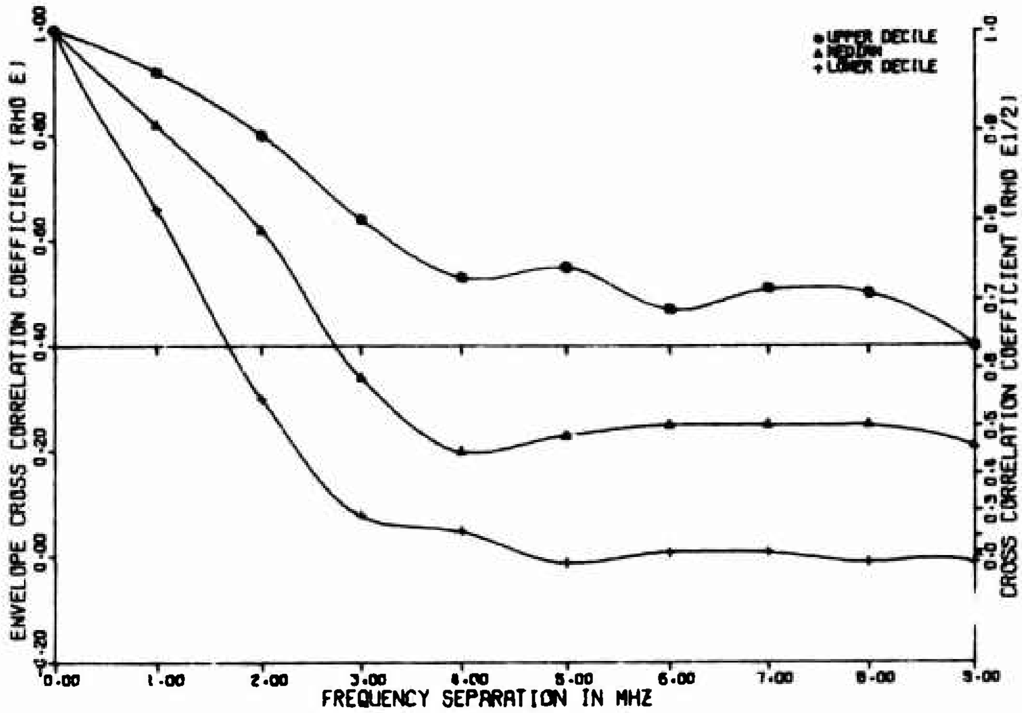
ENVELOPE CROSS CORRELATION COEFFICIENTS
POINT PETRE, WINTER, C-BAND
FROM 1201 TO 1800, 57 TESTS

Figure 164.



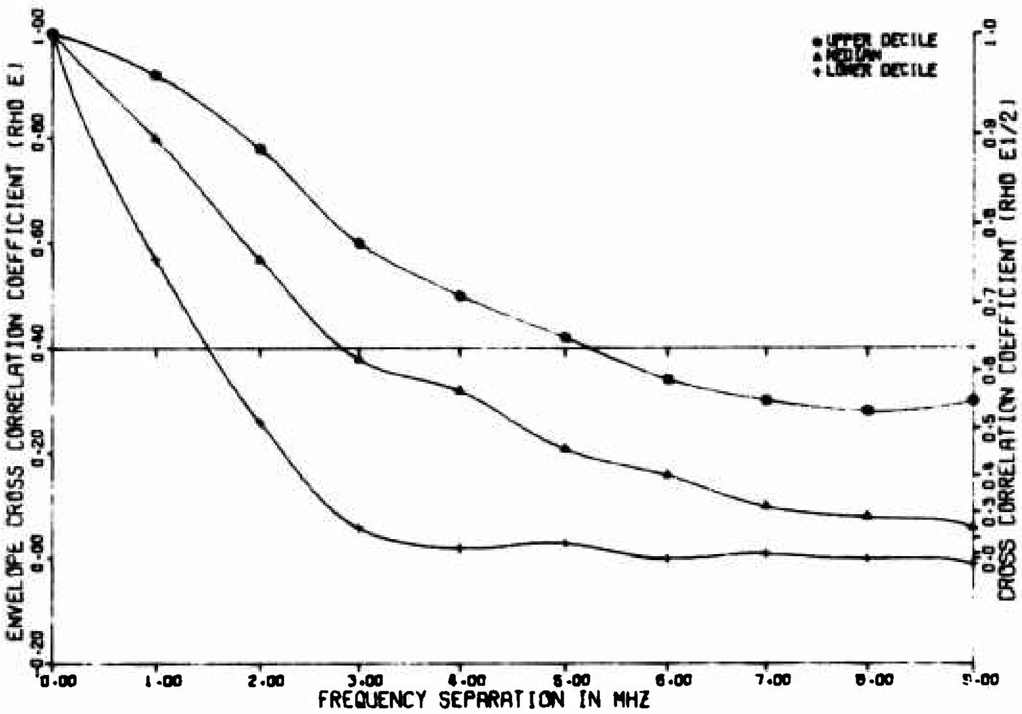
ENVELOPE CROSS CORRELATION COEFFICIENTS
POINT PETRE, WINTER, C-BAND
FROM 1801 TO 2400, 16 TESTS

Figure 165.



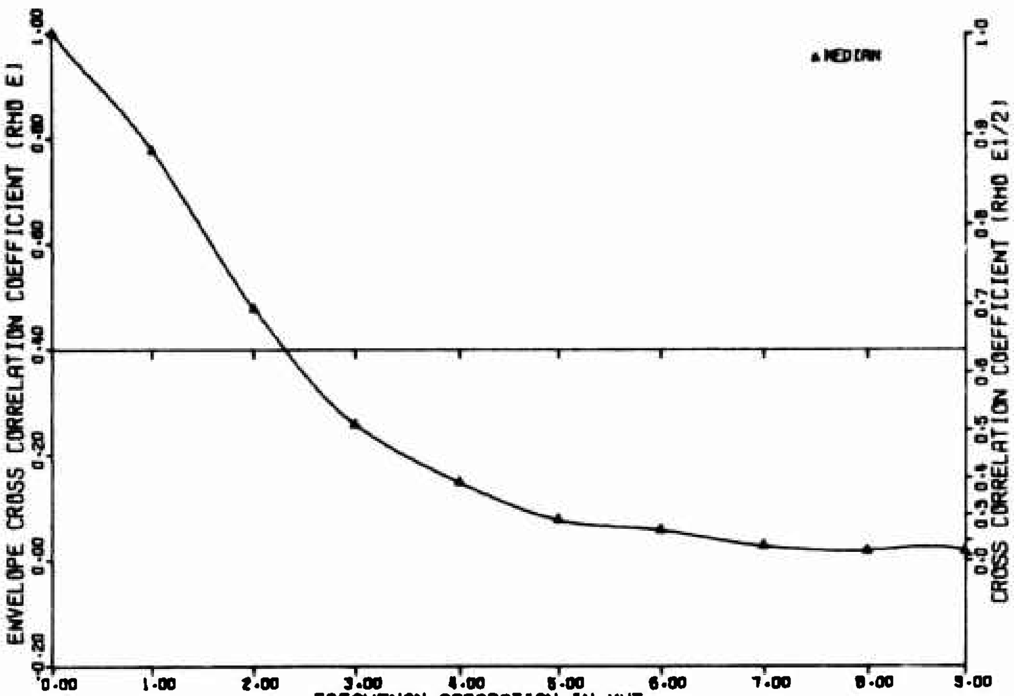
ENVELOPE CROSS CORRELATION COEFFICIENTS
ONTARIO CENTER, WINTER, X-BAND
FROM 0601 TO 1200, 19 TESTS

Figure 166.



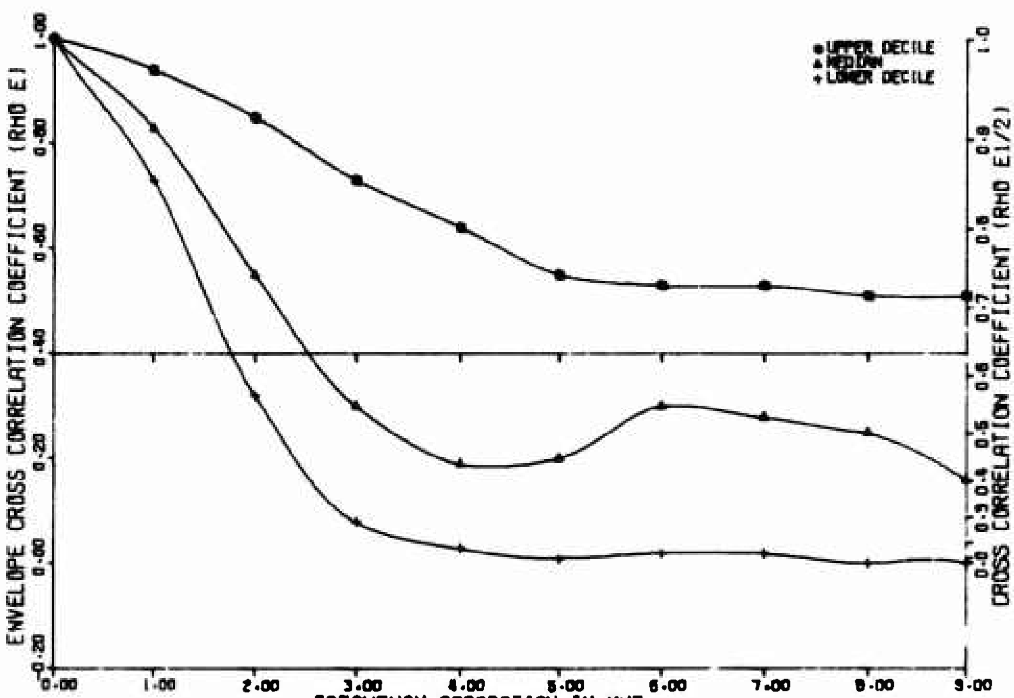
ENVELOPE CROSS CORRELATION COEFFICIENTS
ONTARIO CENTER, WINTER, X-BAND
FROM 1201 TO 1800, 49 TESTS

Figure 167.



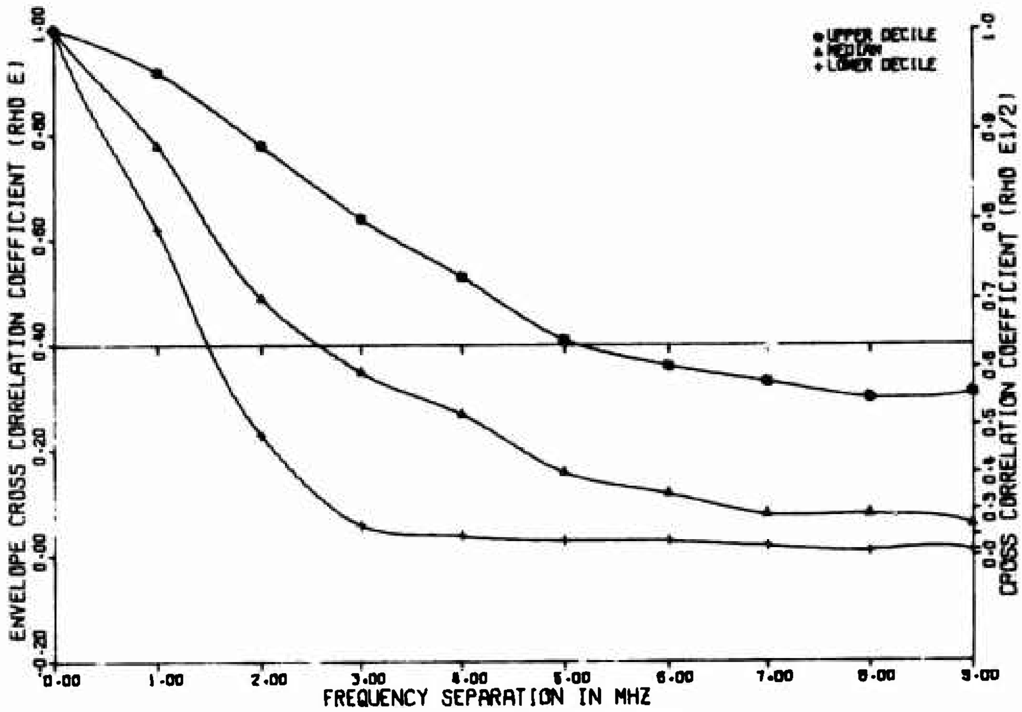
ENVELOPE CROSS CORRELATION COEFFICIENTS
ONTARIO CENTER, WINTER, X-BAND
FROM 1801 TO 2400, 9 TESTS

Figure 168.



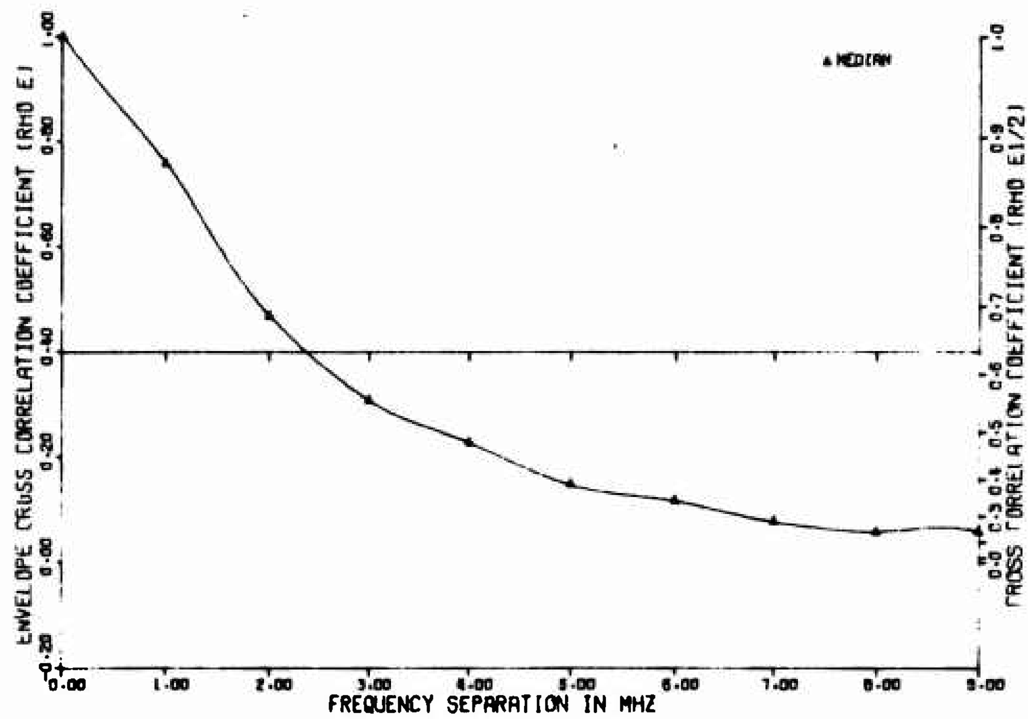
ENVELOPE CROSS CORRELATION COEFFICIENTS
ONTARIO CENTER, WINTER, C-BAND
FROM 0601 TO 1200, 18 TESTS

Figure 169.



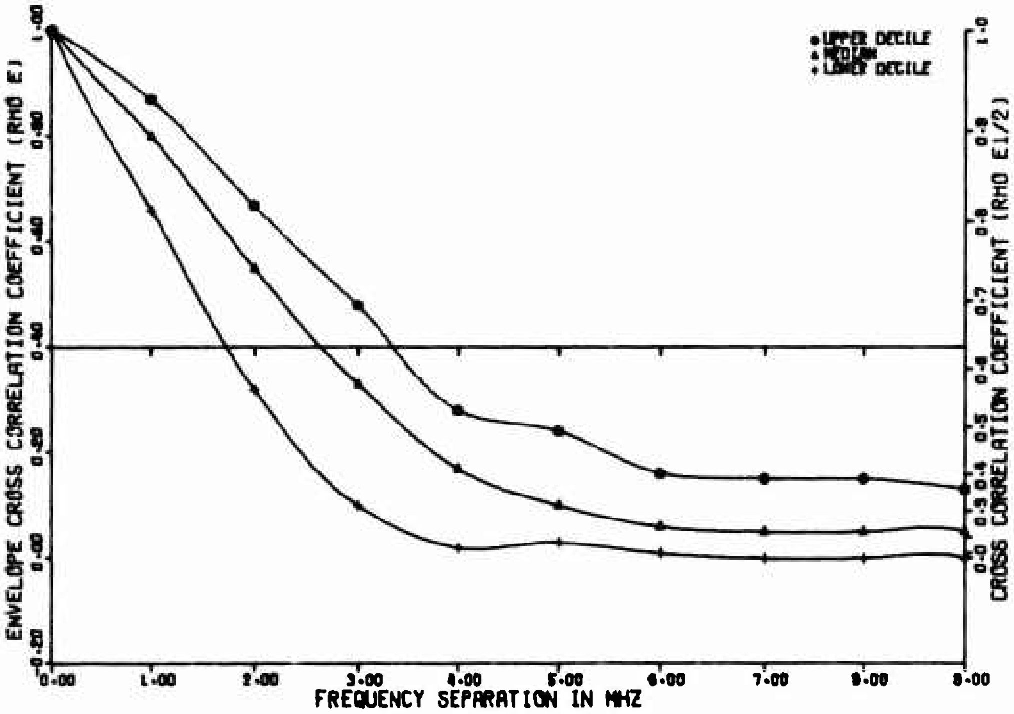
ENVELOPE CROSS CORRELATION COEFFICIENTS
ONTARIO CENTER, WINTER. C-BAND
FROM 1201 TO 1800, 43 TESTS

Figure 170.



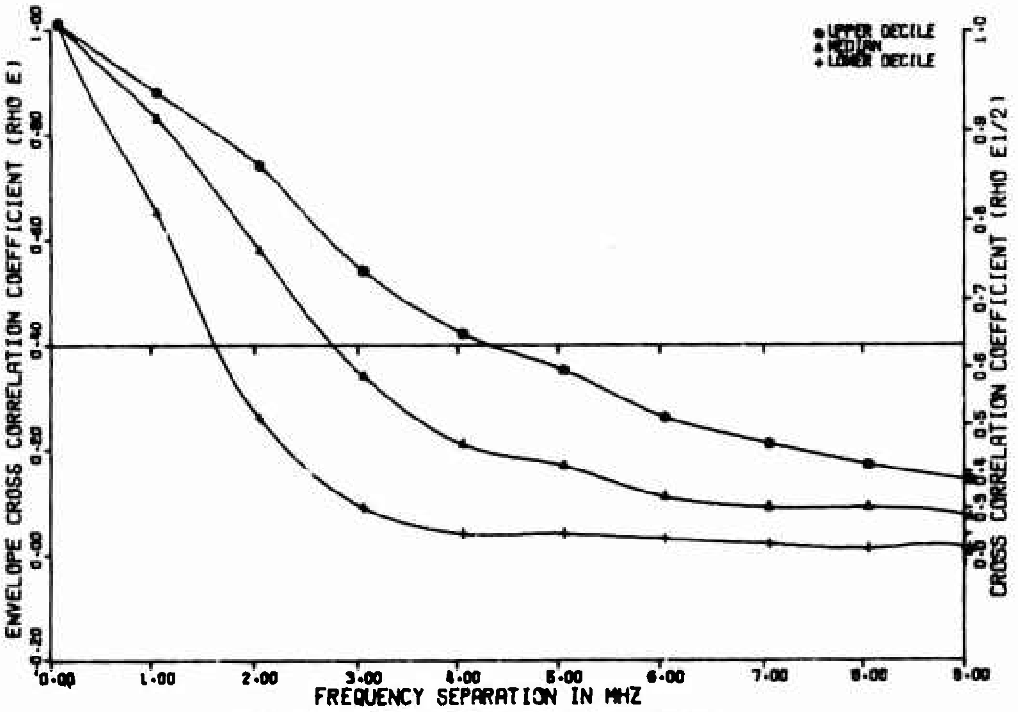
ENVELOPE CROSS CORRELATION COEFFICIENTS
ONTARIO CENTER, WINTER. C-BAND
FROM 1801 TO 2400, 6 TESTS

Figure 171.



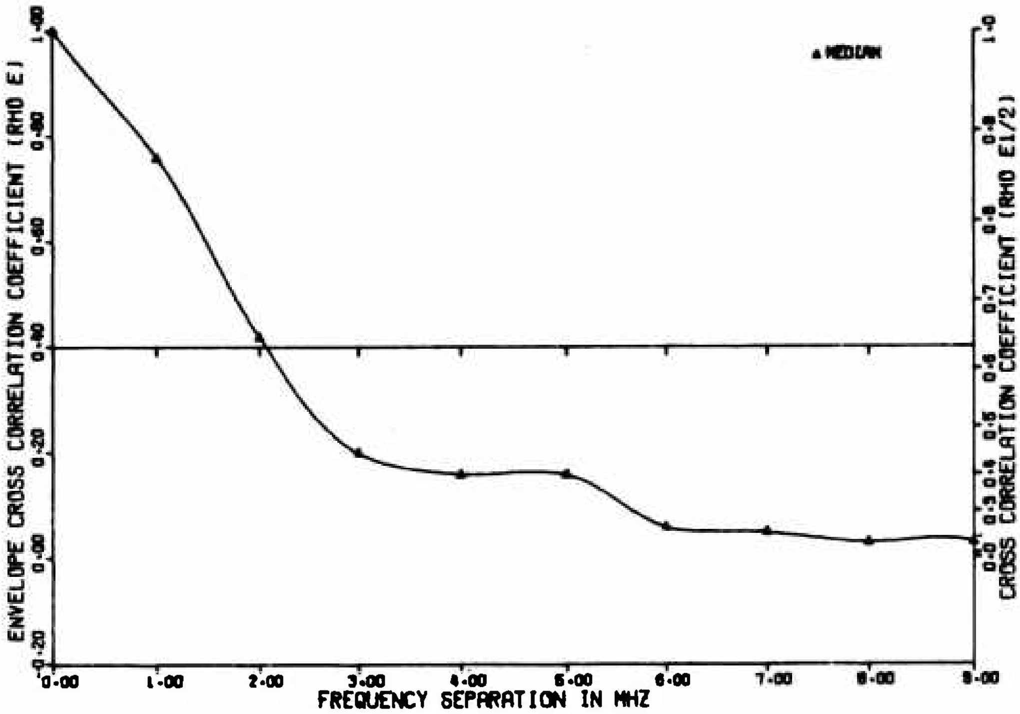
ENVELOPE CROSS CORRELATION COEFFICIENTS
PORT BYRON, FEBRUARY, X-BAND
FROM 0601 TO 1200, 27 TESTS

Figure 172.



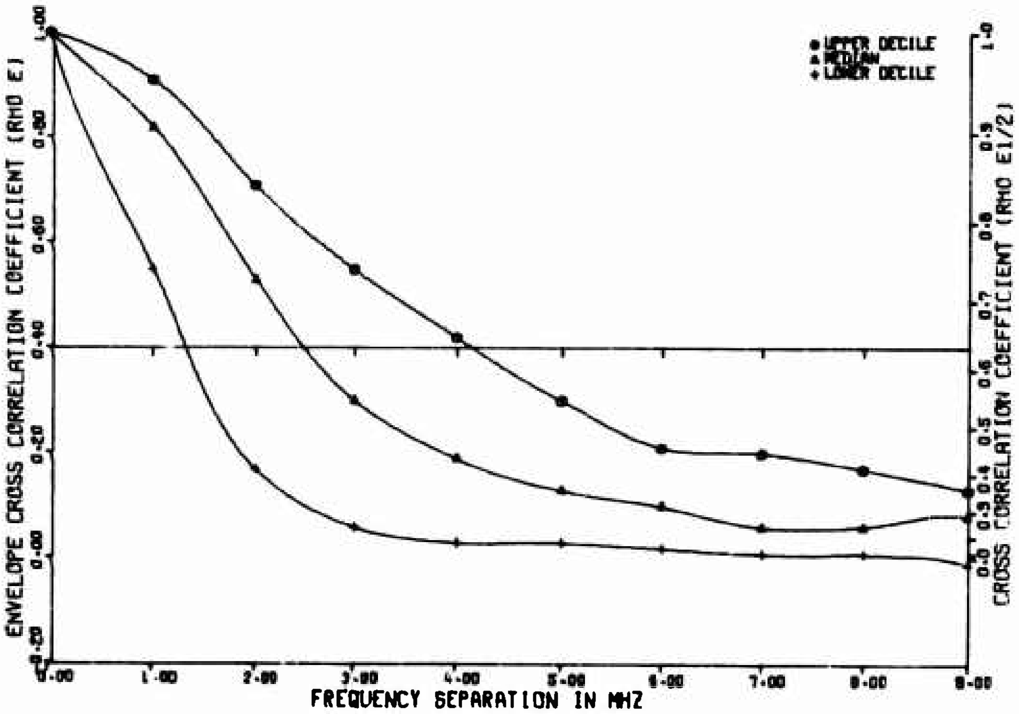
ENVELOPE CROSS CORRELATION COEFFICIENTS
PORT BYRON, FEBRUARY, X-BAND
FROM 1201 TO 1800, 33 TESTS

Figure 173.



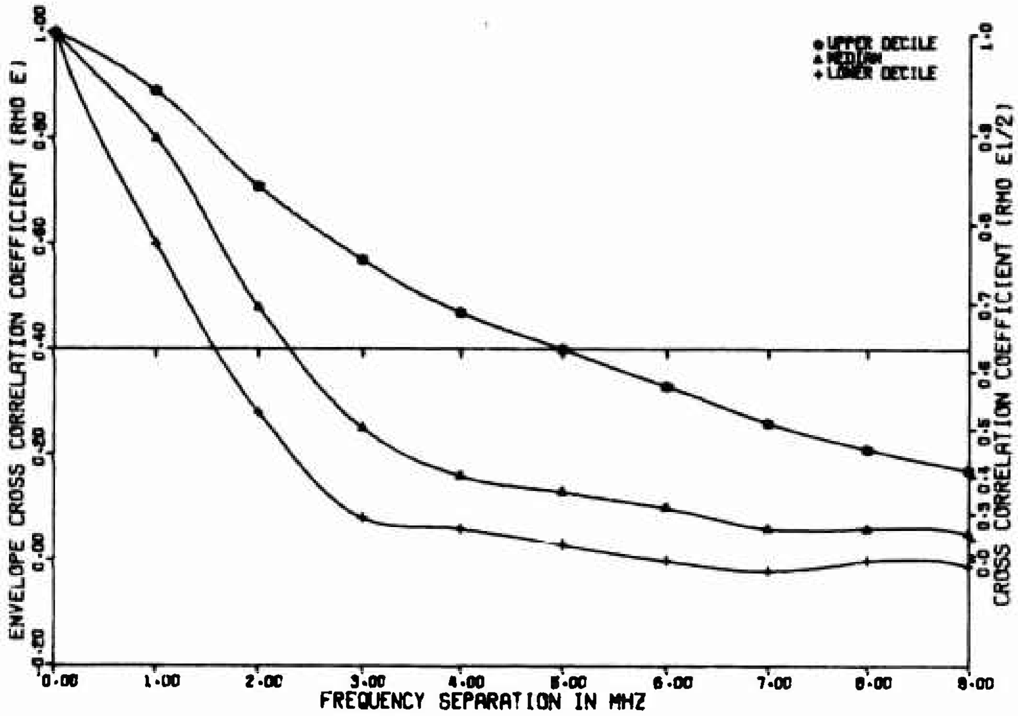
ENVELOPE CROSS CORRELATION COEFFICIENTS
PORT BYRON, FEBRUARY, X-BAND
FROM 1801 TO 2400, 4 TESTS

Figure 174.



ENVELOPE CROSS CORRELATION COEFFICIENTS
PORT BYRON, FEBRUARY, C-BAND
FROM 0601 TO 1200, 33 TESTS

Figure 175.

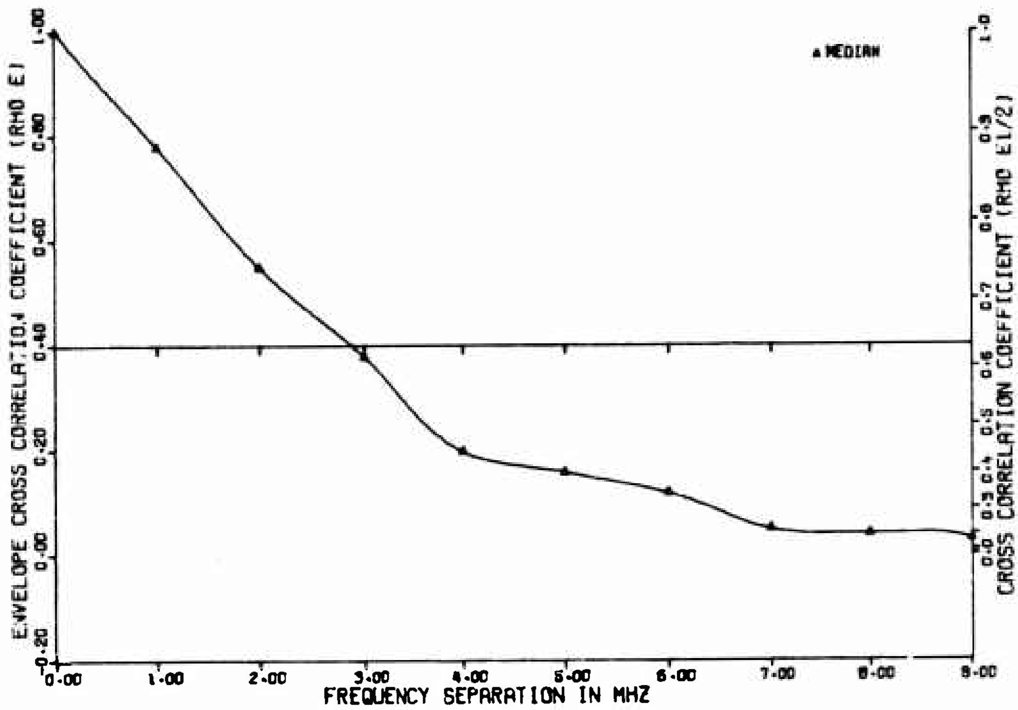


ENVELOPE CROSS CORRELATION COEFFICIENTS

PORT BYRON, FEBRUARY, C-BAND

FROM 1201 TO 1800, 37 TESTS

Figure 176.



ENVELOPE CROSS CORRELATION COEFFICIENTS

PORT BYRON, FEBRUARY, C-BAND

FROM 1801 TO 2400, 5 TESTS

Figure 177.

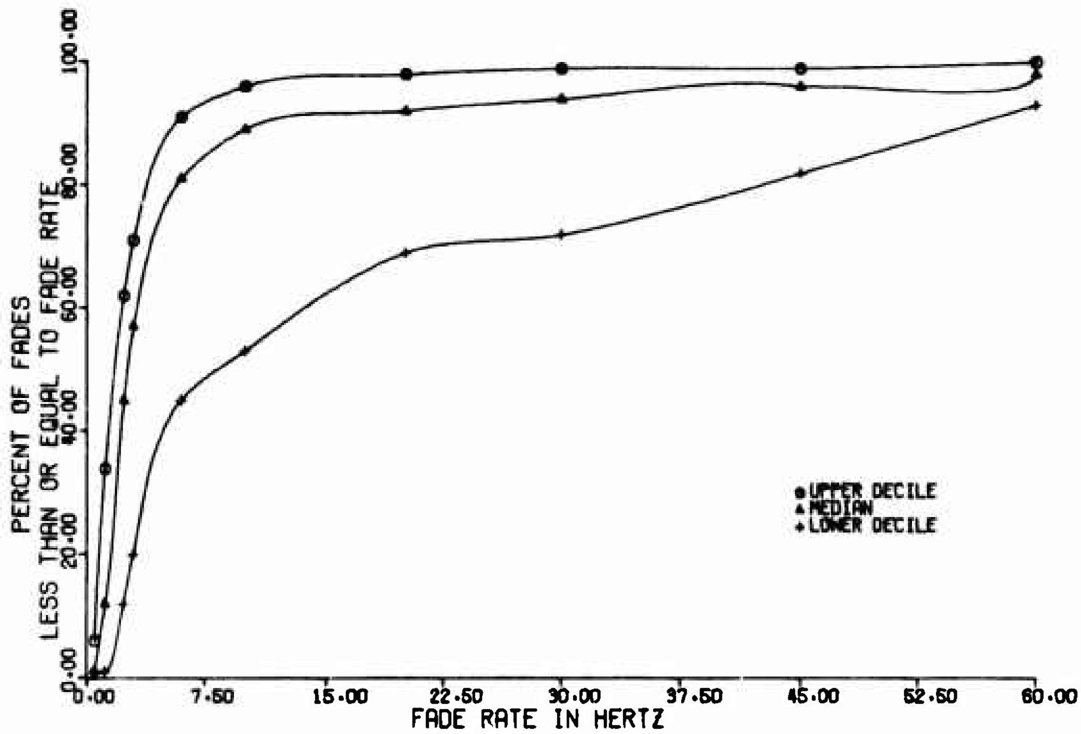
B. FADE RATE DISTRIBUTIONS

Figures 178 through 226 are distributions of fade rate data. Since more rapid fading occurs on X-band than on C-band, the fade rate scale has been set to a maximum value of 6C Hertz for X-band plots and 20 Hertz for C-band plots. The ordinate gives the percent of fades less than or equal to the fade rate given by the abscissa. Distribution plots for "All" of the X- and C-band tests run during each of the test periods are shown. Typical temperature and diurnal effect plots are also included. When no marked changes occurred with time and temperature variations, the plots are not included in this report. Furthermore, after several examples of typical variations of tests due to changing conditions are given, additional plots are omitted. The summary bar graphs shown at the end of this section allow a comparison of the relative spread of all plots.

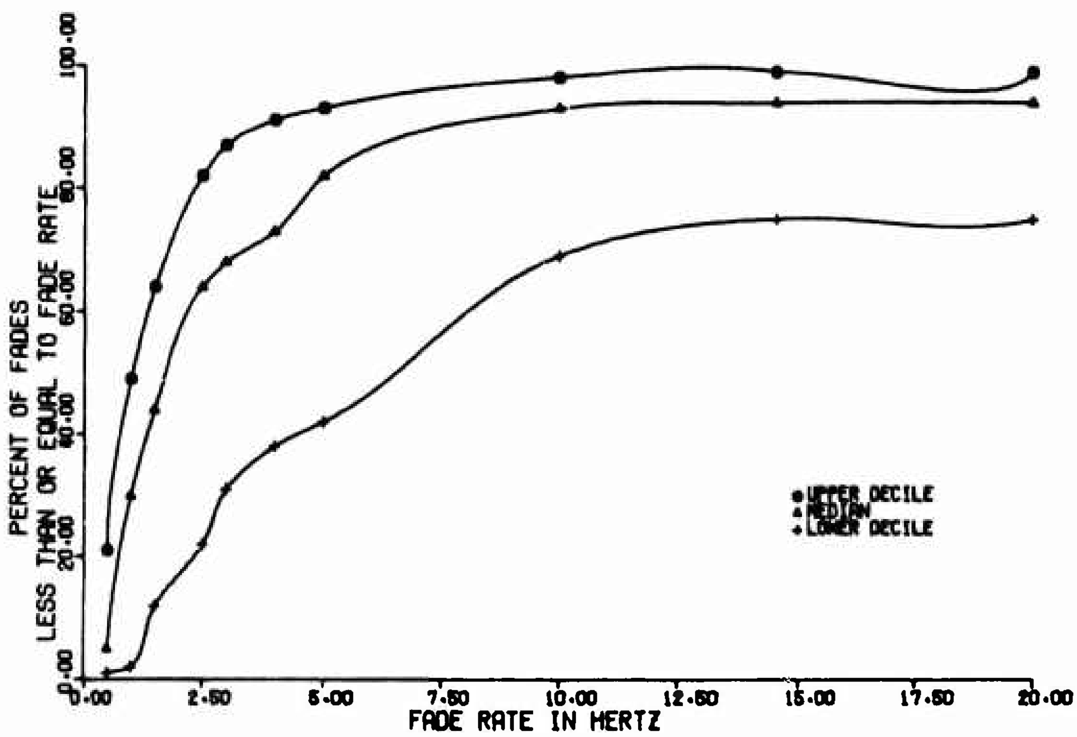
1. Overall Fade Rate Distributions

Figures 178 through 193 give the distributions of fade rates observed over the four paths. The plots are arranged in the order of season or month, then by site, and finally by frequency band. For all curves the observed upper and lower deciles and median are indicated together with the number of tests for which the distributions were calculated.

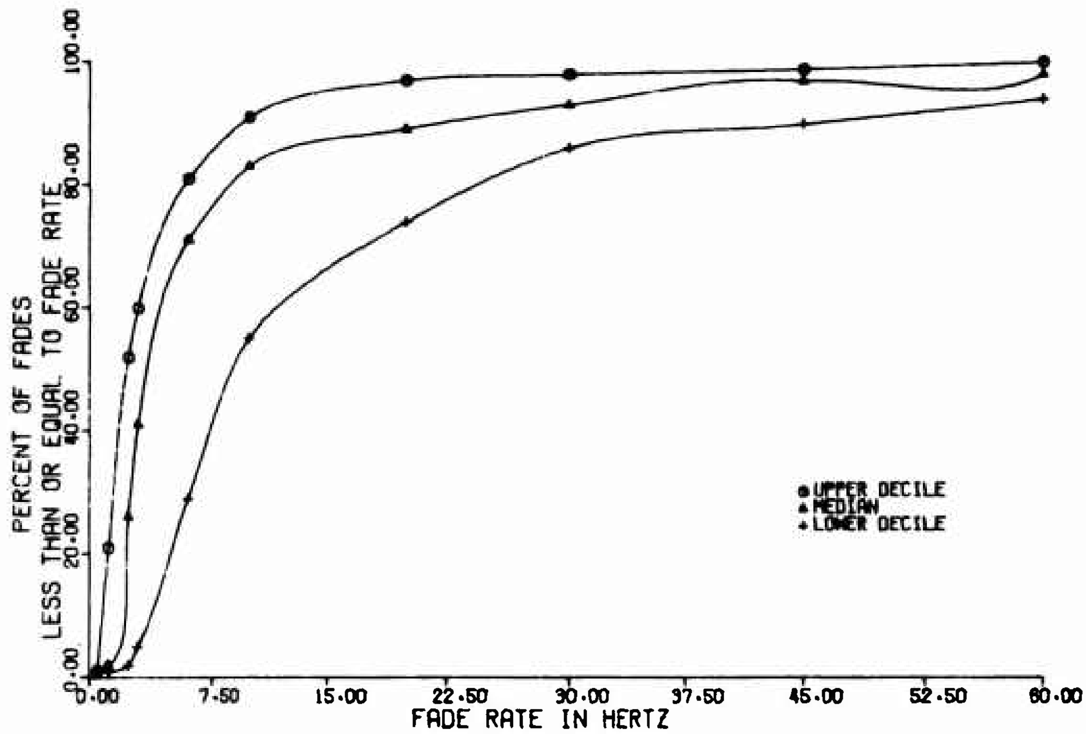
For all paths the fade rate distributions are very similar and indicate no seasonal dependence. The variation in the deciles is not statistically significant. There is however a marked difference between the X- and C-band data. On the average 50 percent of all X-band fades occurred at a rate less than about 4 Hz while at C-band the value is approximately 3 Hz. At the 80 percent level the values are approximately 9 Hz for X-band and 6 Hz for C-band.



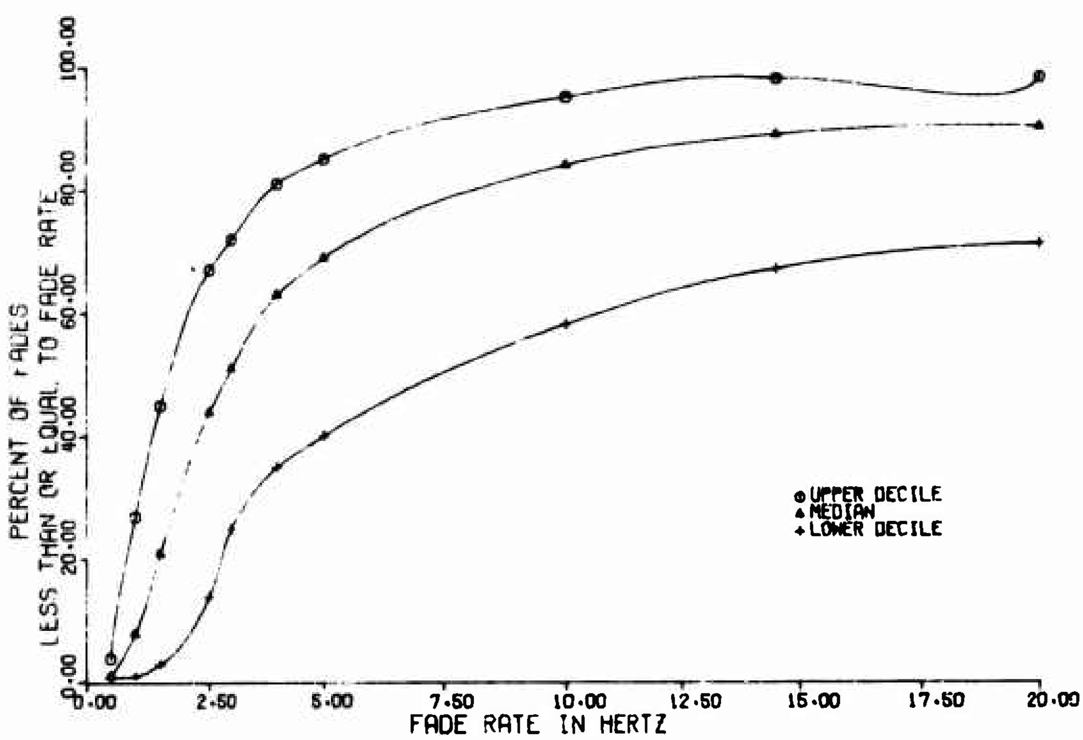
FADE RATE DISTRIBUTION
ONTARIO CENTER, SUMMER, X-BAND
ALL, 88 TESTS
Figure 178.



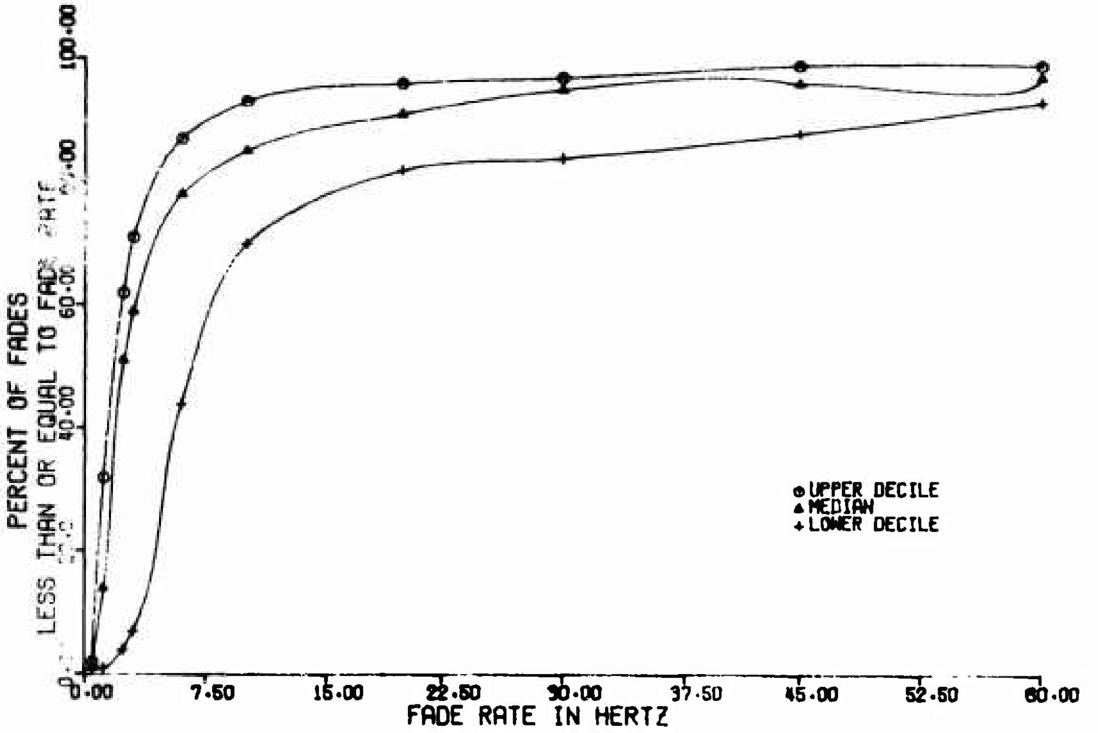
FADE RATE DISTRIBUTION
ONTARIO CENTER, SUMMER, C-BAND
ALL, 45 TESTS
Figure 179.



FADE RATE DISTRIBUTION
WHITFORD FIELD, SUMMER, X-BAND
ALL, 41 TESTS
Figure 180.

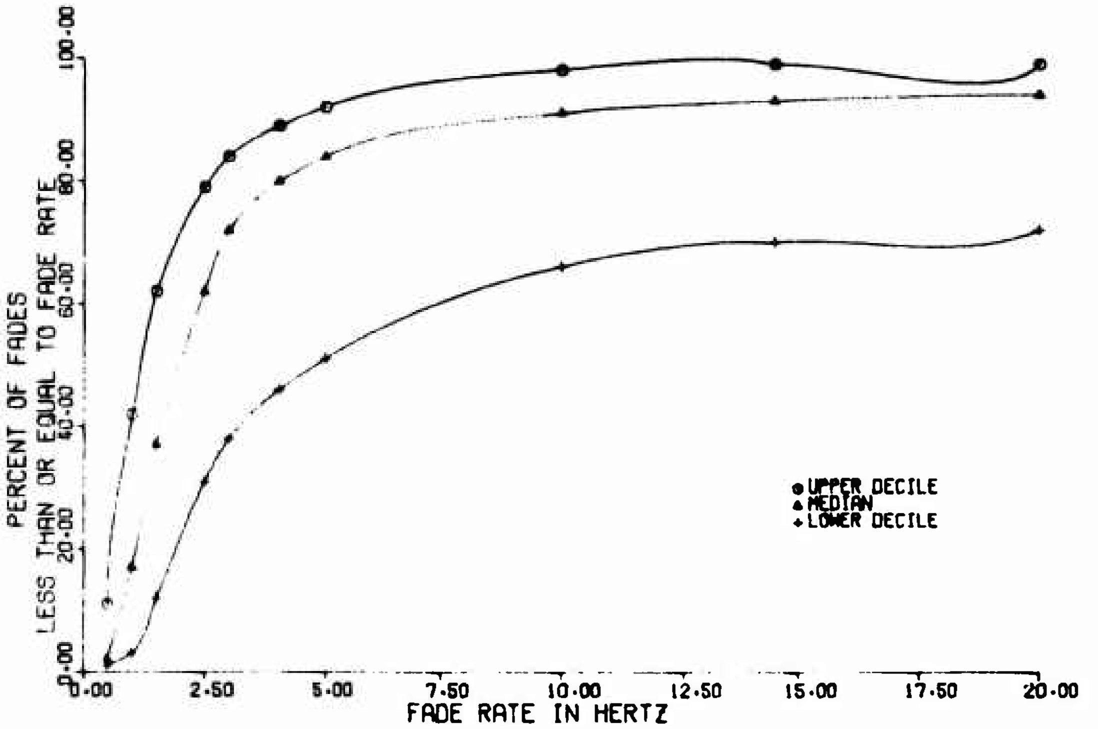


FADE RATE DISTRIBUTION
WHITFORD FIELD, SUMMER, C-BAND
ALL, 77 TEST.
Figure 181.



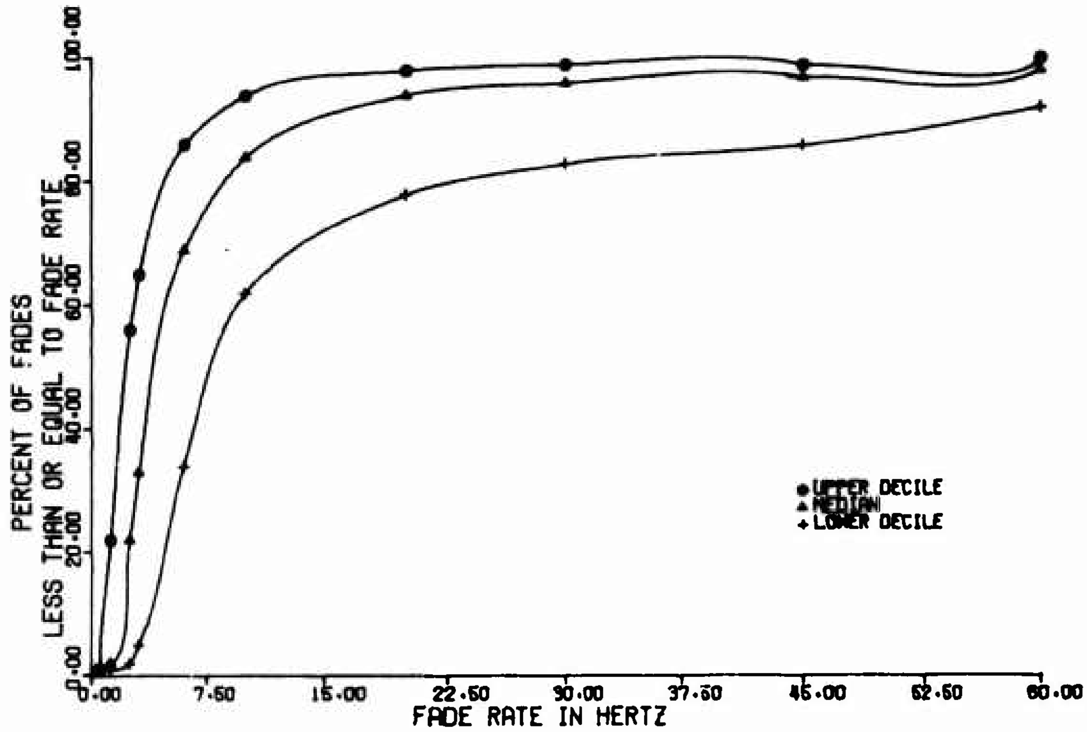
FADE RATE DISTRIBUTION
POINT PETRE, SEPTEMBER, X-BAND
ALL, 96 TESTS

Figure 182.

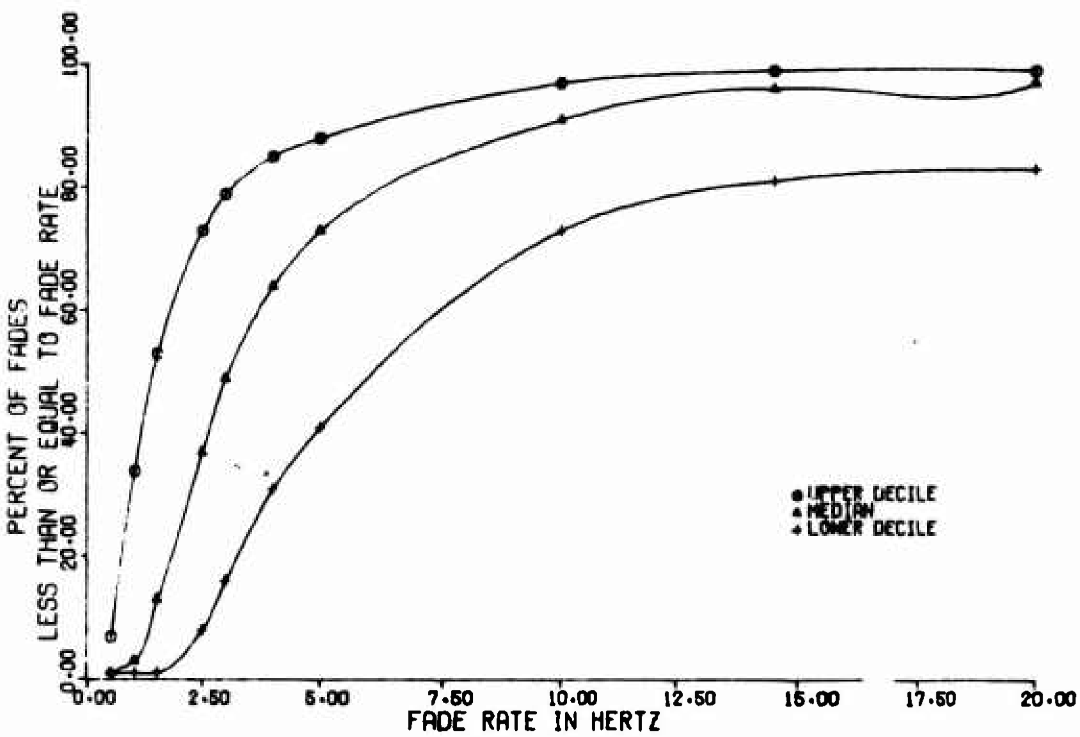


FADE RATE DISTRIBUTION
POINT PETRE, SEPTEMBER, C-BAND
ALL, 104 TESTS

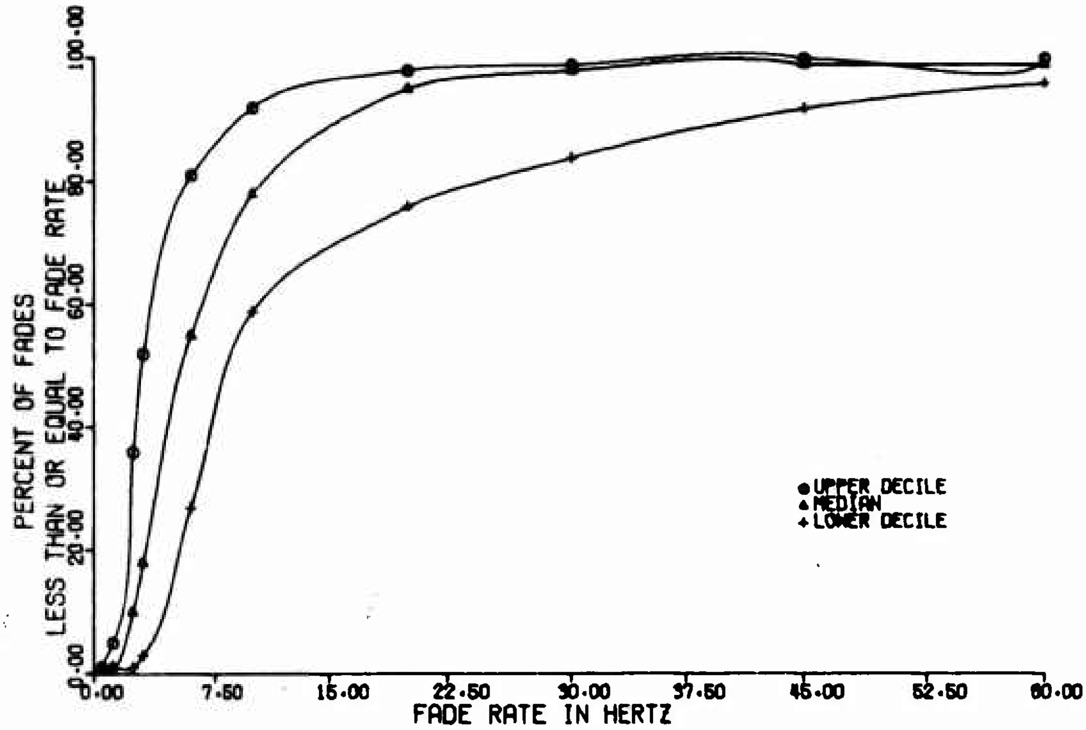
Figure 183.



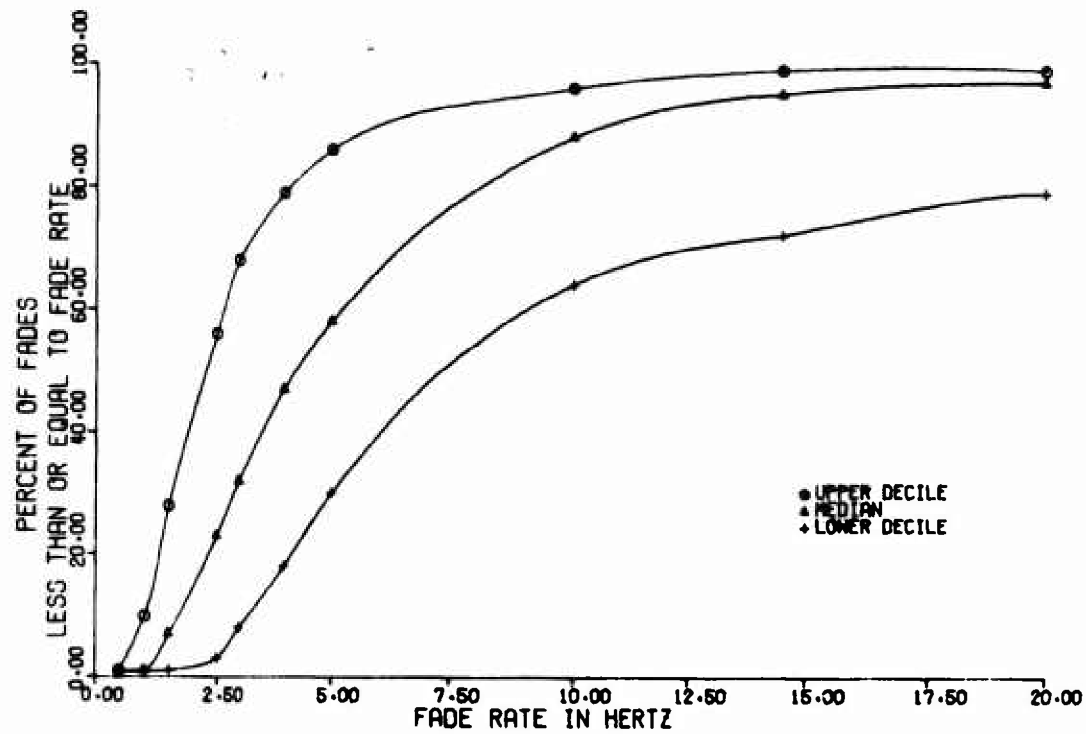
FADE RATE DISTRIBUTION
ONTARIO CENTER, OCTOBER, X-BAND
ALL, 124 TESTS
Figure 184.



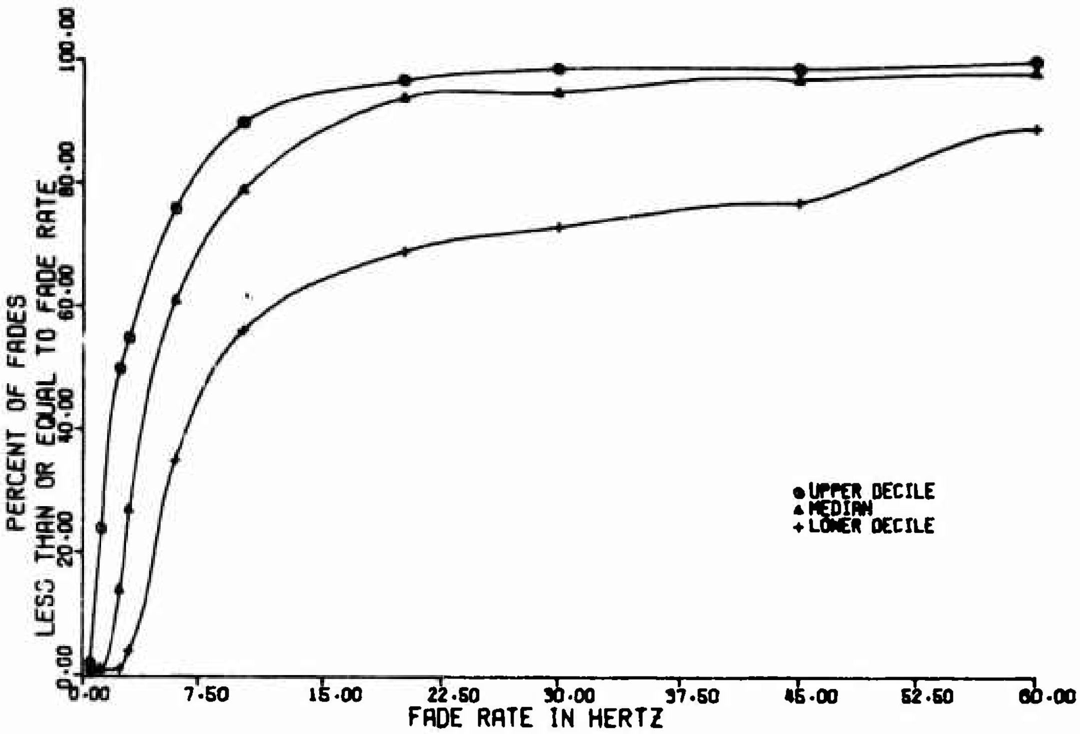
FADE RATE DISTRIBUTION
ONTARIO CENTER, OCTOBER, C-BAND
ALL, 127 TESTS
Figure 185.



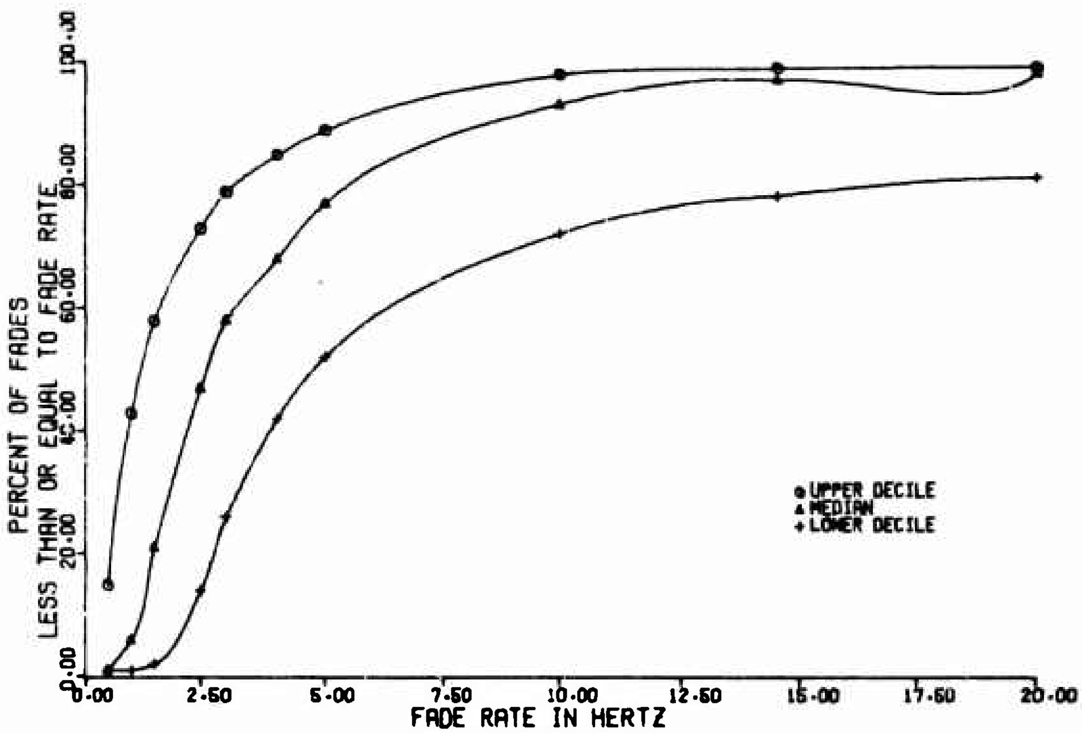
FADE RATE DISTRIBUTION
WHITFORD FIELD, NOVEMBER, X-BAND
ALL, 76 TESTS
Figure 186.



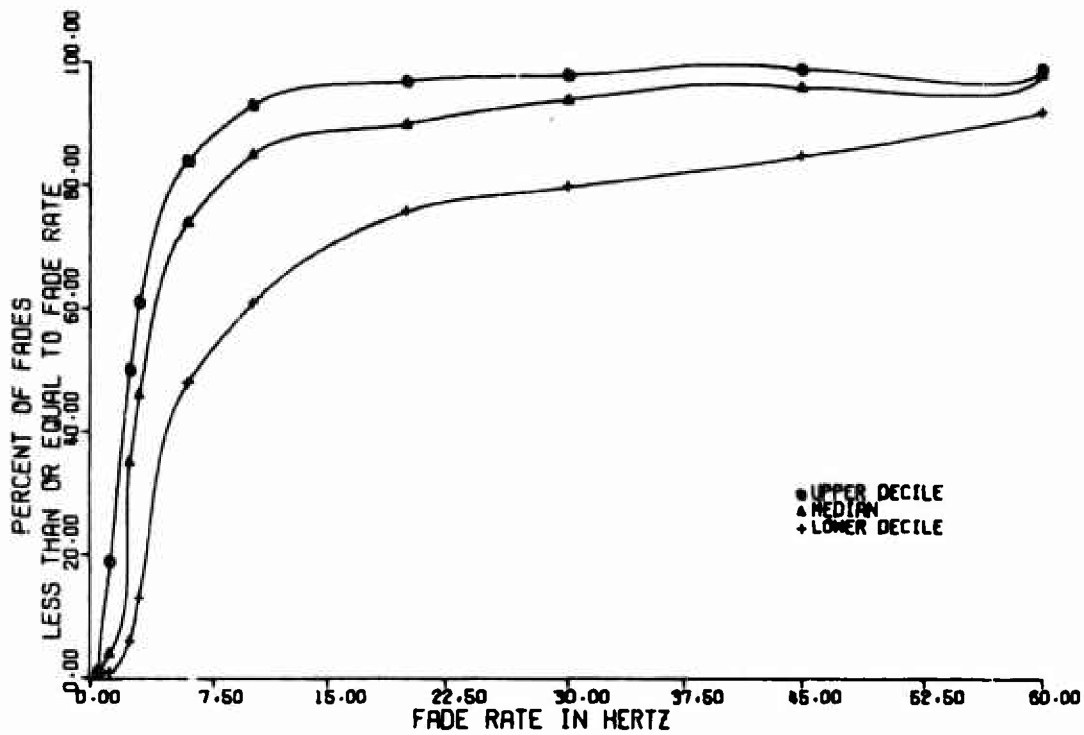
FADE RATE DISTRIBUTION
WHITFORD FIELD, NOVEMBER, C-BAND
ALL, 62 TESTS
Figure 187.



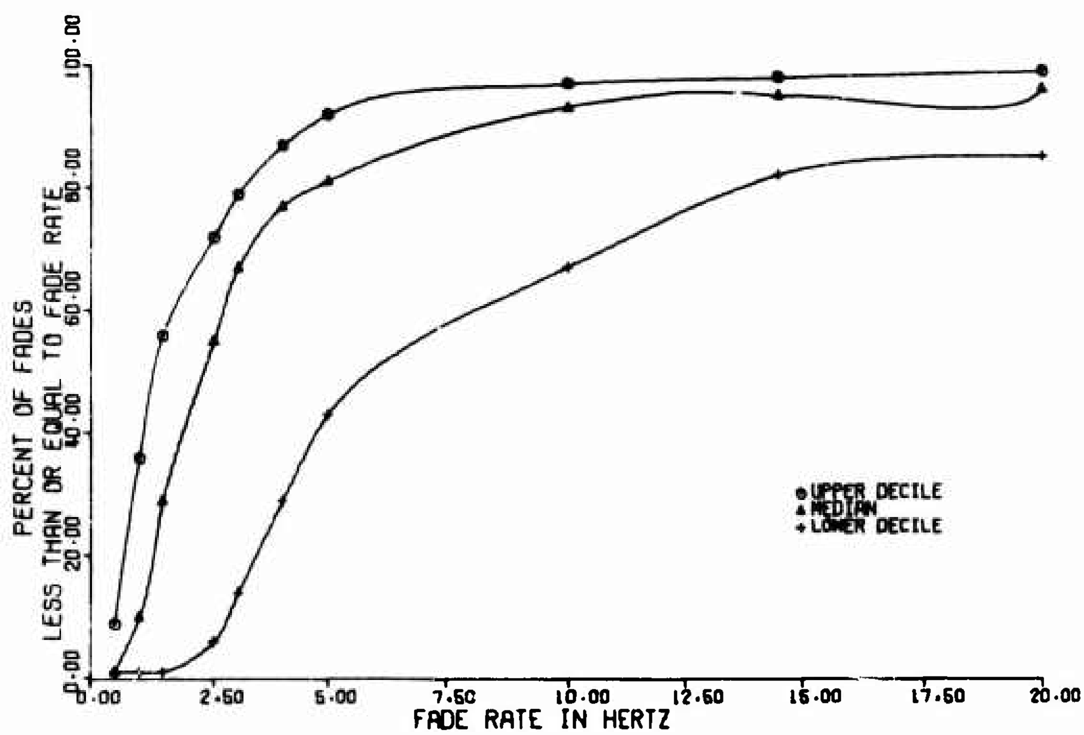
FADE RATE DISTRIBUTION
POINT PETRE, WINTER, X-BAND
ALL, 87 TESTS
Figure 188.



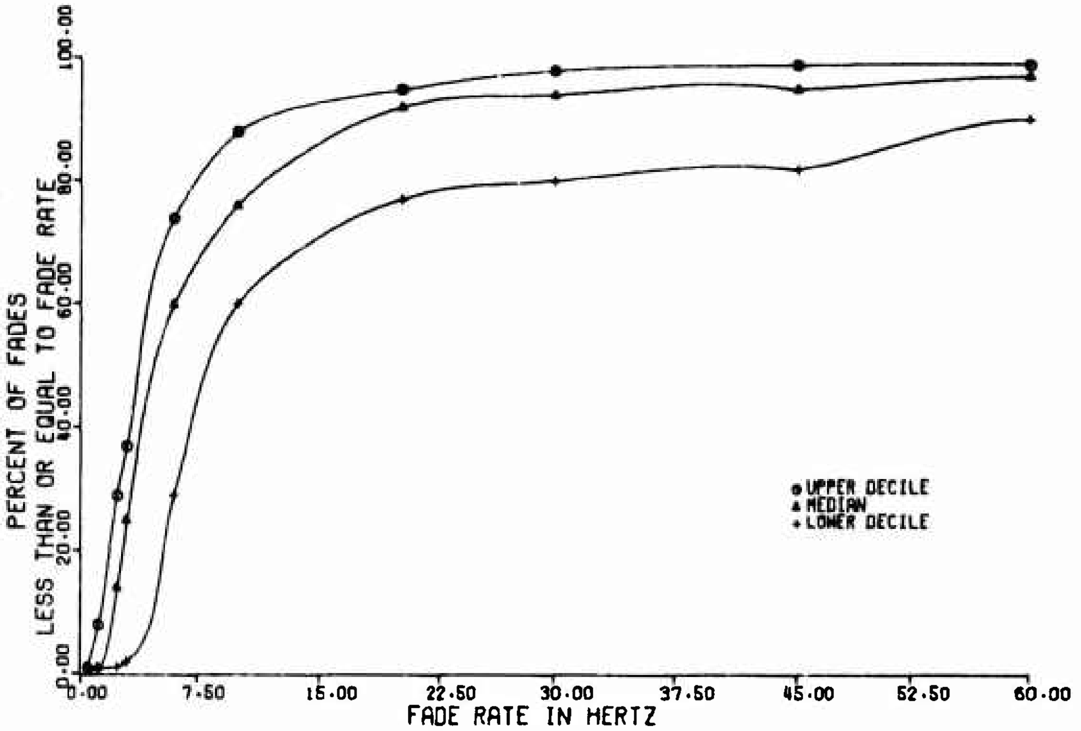
FADE RATE DISTRIBUTION
POINT PETRE, WINTER, C-BAND
ALL, 110 TESTS
Figure 189.



FADE RATE DISTRIBUTION
ONTARIO CENTER, WINTER, X-BAND
ALL, 80 TESTS
Figure 190.



FADE RATE DISTRIBUTION
ONTARIO CENTER, WINTER, C-BAND
ALL, 69 TESTS
Figure 191.

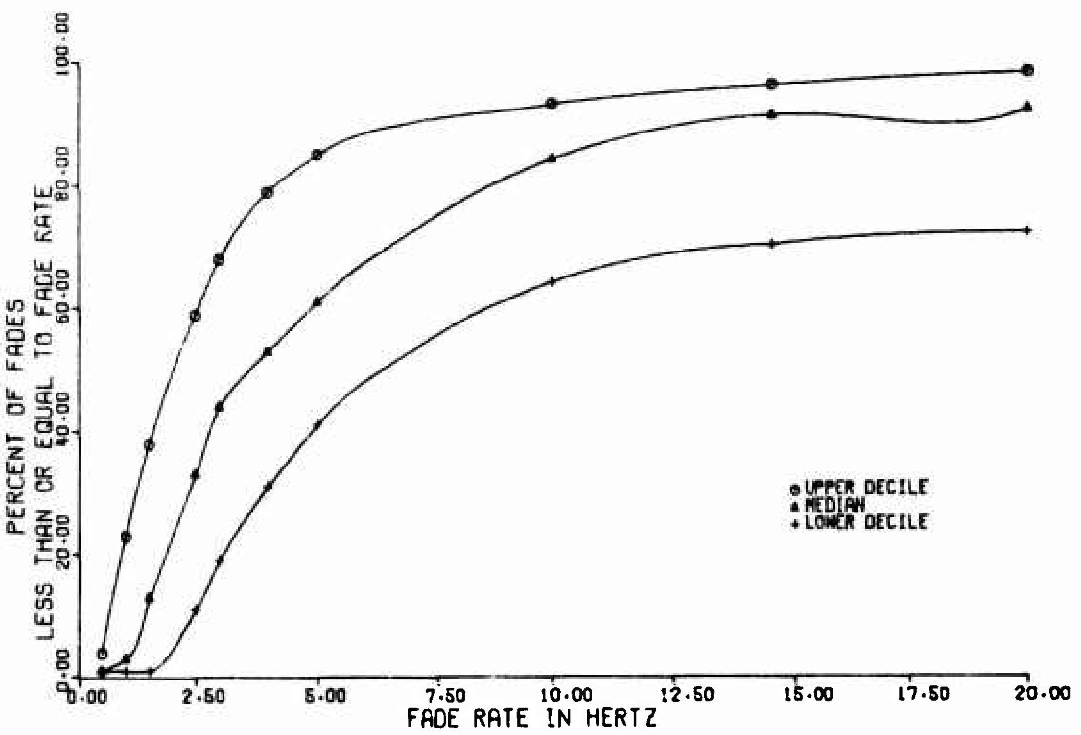


FADE RATE DISTRIBUTION

PORT BYRON, FEBRUARY, X-BAND

ALL, 64 TESTS

Figure 192.



FADE RATE DISTRIBUTION

PORT BYRON, FEBRUARY, C-BAND

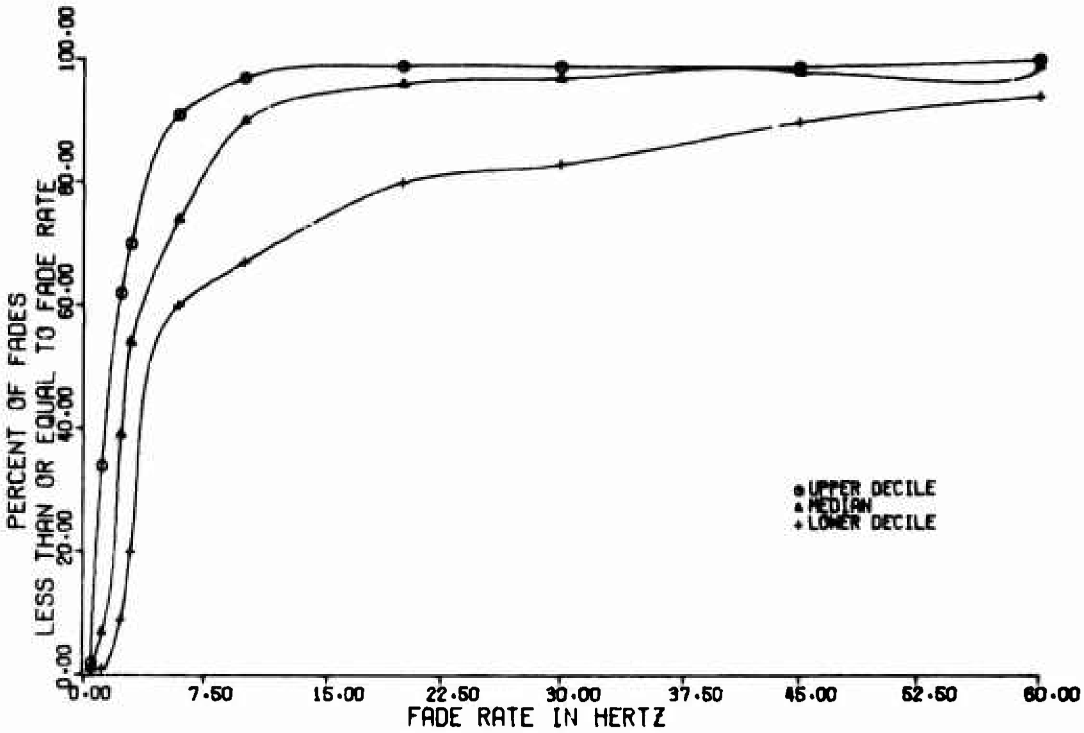
ALL, 75 TESTS

Figure 193.

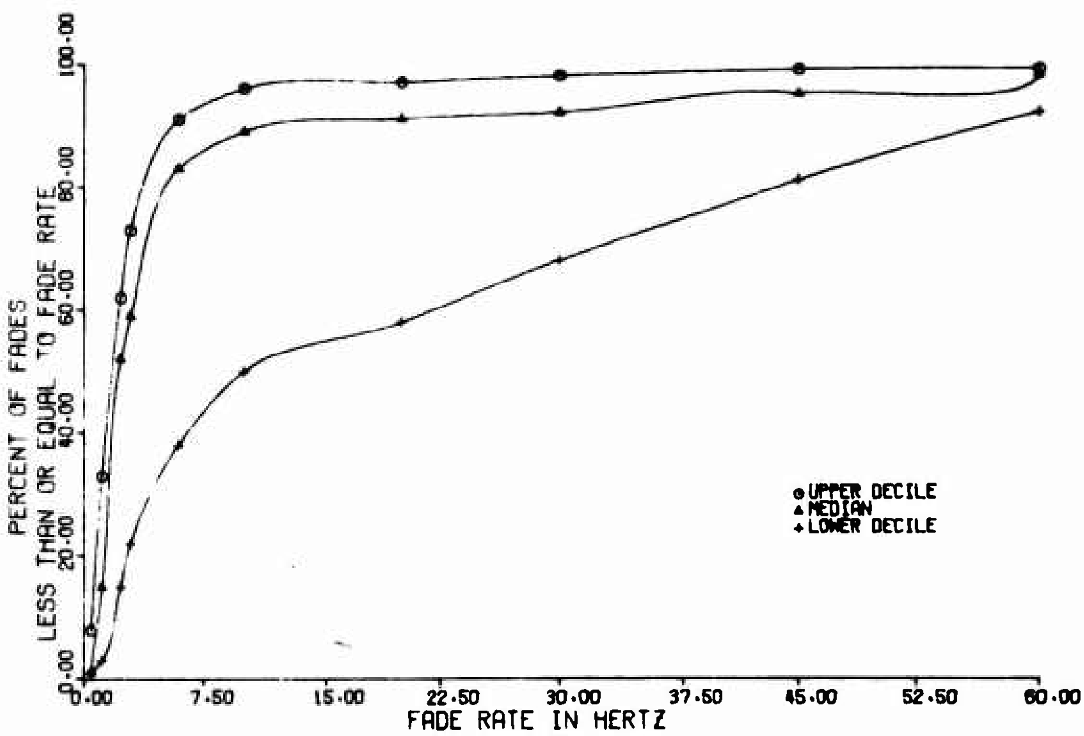
2. Fade Rate Distributions - Temperature Effects

In a format similar to the preceding subsection, Figures 194 through 209 show the observed fade rate distributions, but subdivided into two Fahrenheit temperature ranges. These temperature ranges are given on the figures and were chosen so that the crossover point is approximately the average temperature for the time and location of the measurements.

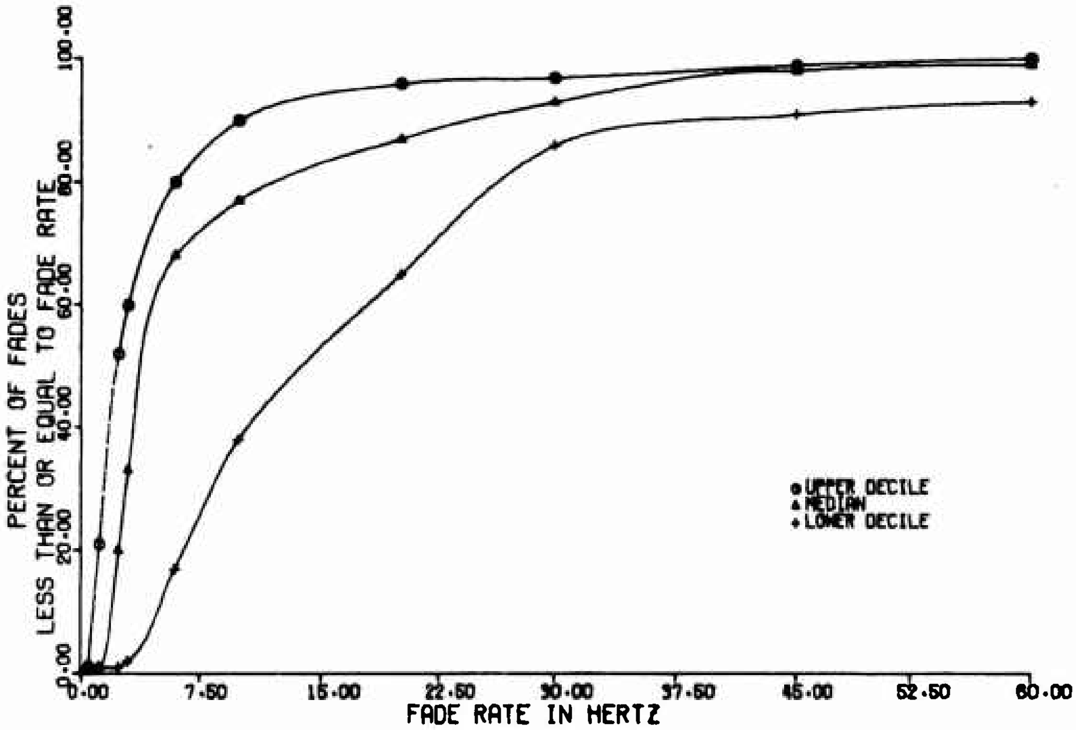
The first six figures were calculated from X-band data, the last ten from C-band. Only a representative sample of available plots is presented here since all data collected indicated there was no significant dependence of fade rate on surface temperature.



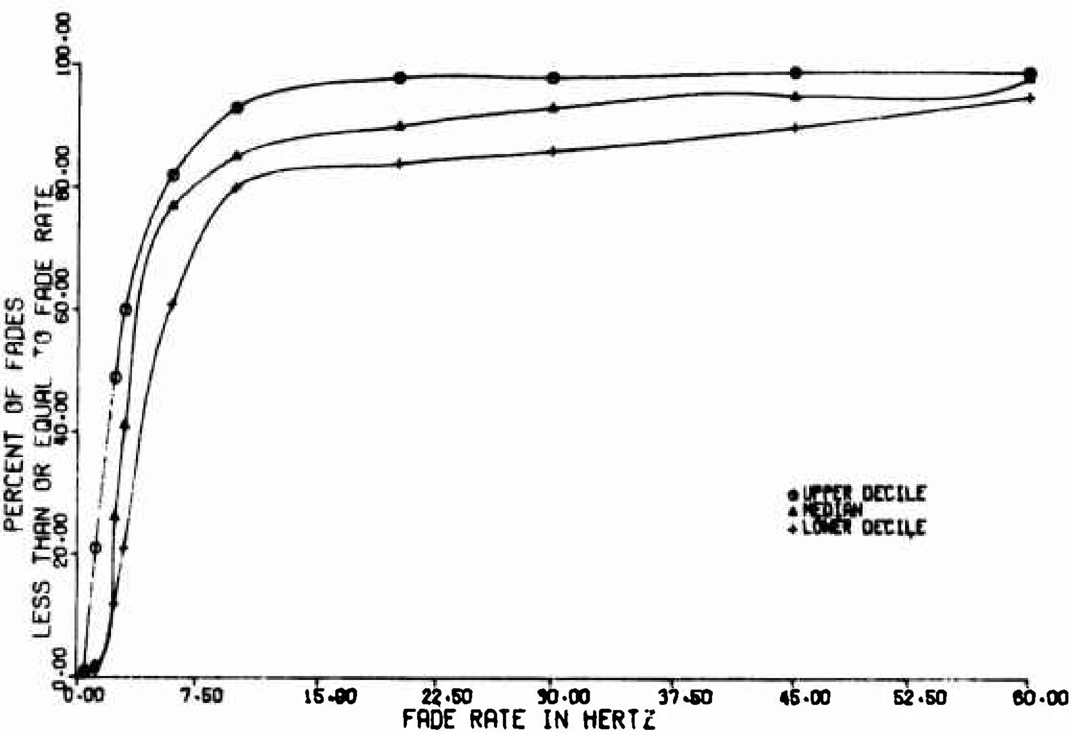
FADE RATE DISTRIBUTION
ONTARIO CENTER, SUMMER, X-BAND
TEMPERATURE OVER 77 DEGREES F., 40 TESTS
Figure 194.



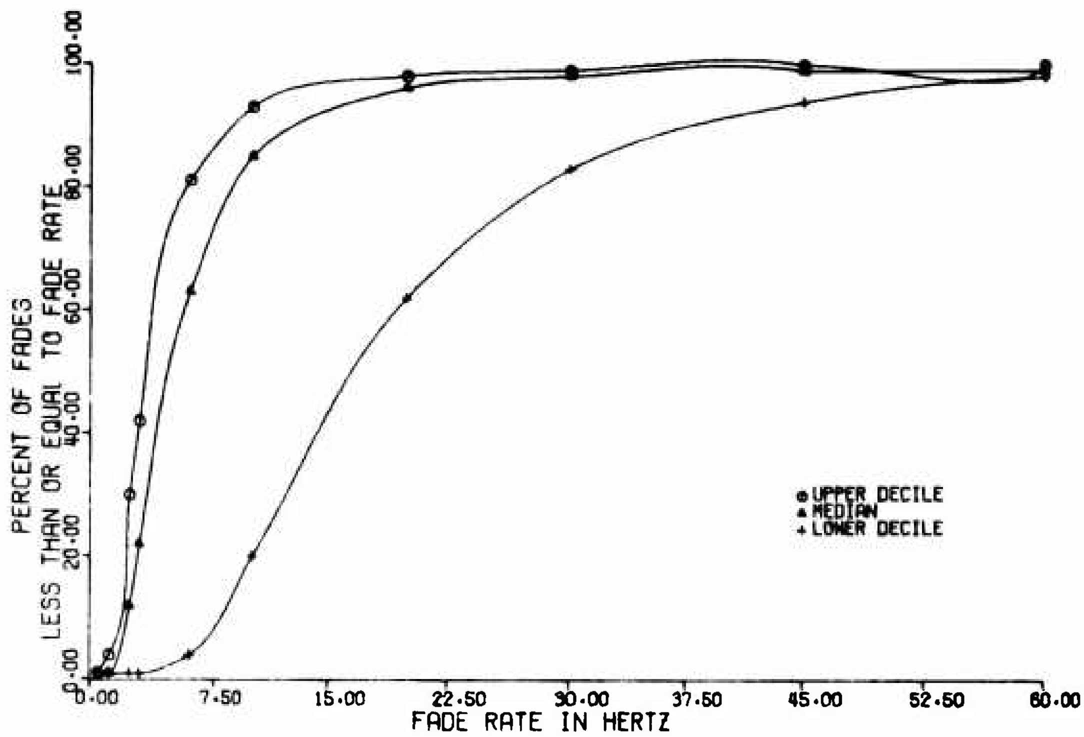
FADE RATE DISTRIBUTION
ONTARIO CENTER, SUMMER, X-BAND
TEMPERATURE NOT OVER 77 DEGREES F., 48 TESTS
Figure 195.



FADE RATE DISTRIBUTION
WHITFORD FIELD, SUMMER, X-BAND
TEMPERATURE OVER 77 DEGREES F., 20 TESTS
Figure 196.



FADE RATE DISTRIBUTION
WHITFORD FIELD, SUMMER, X-BAND
TEMPERATURE NOT OVER 77 DEGREES F., 21 TESTS
Figure 197.

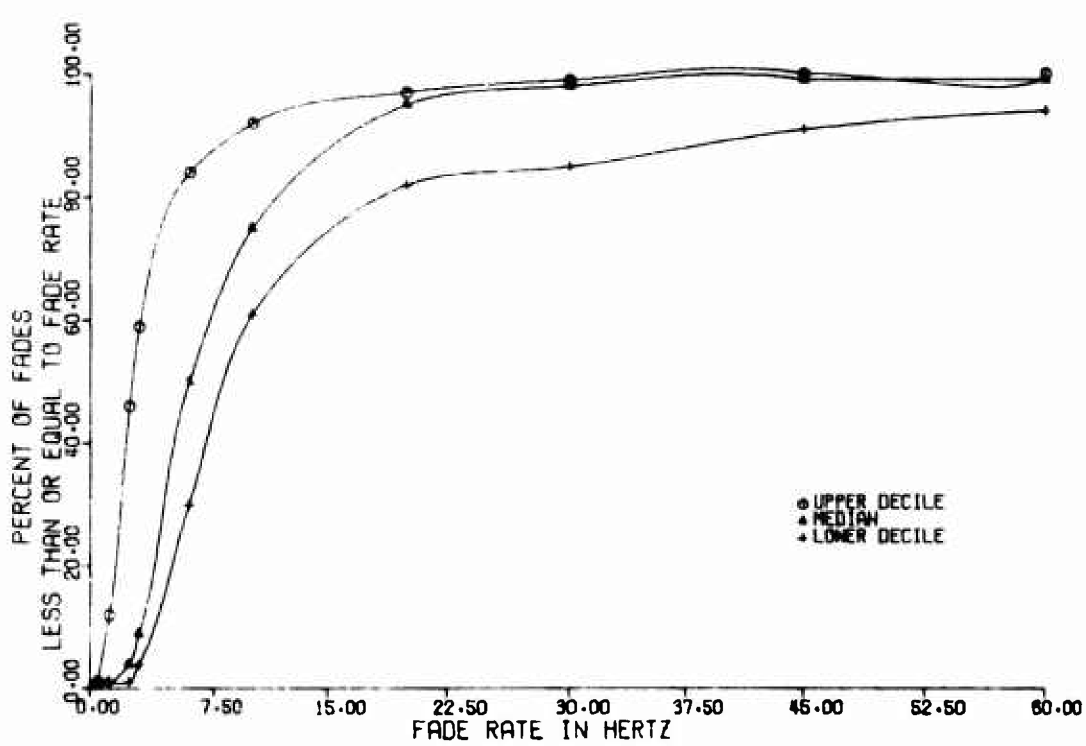


FADE RATE DISTRIBUTION

WHITFORD FIELD, NOVEMBER, X-BAND

TEMPERATURE OVER 49 DEGREES F., 32 TESTS

Figure 198.

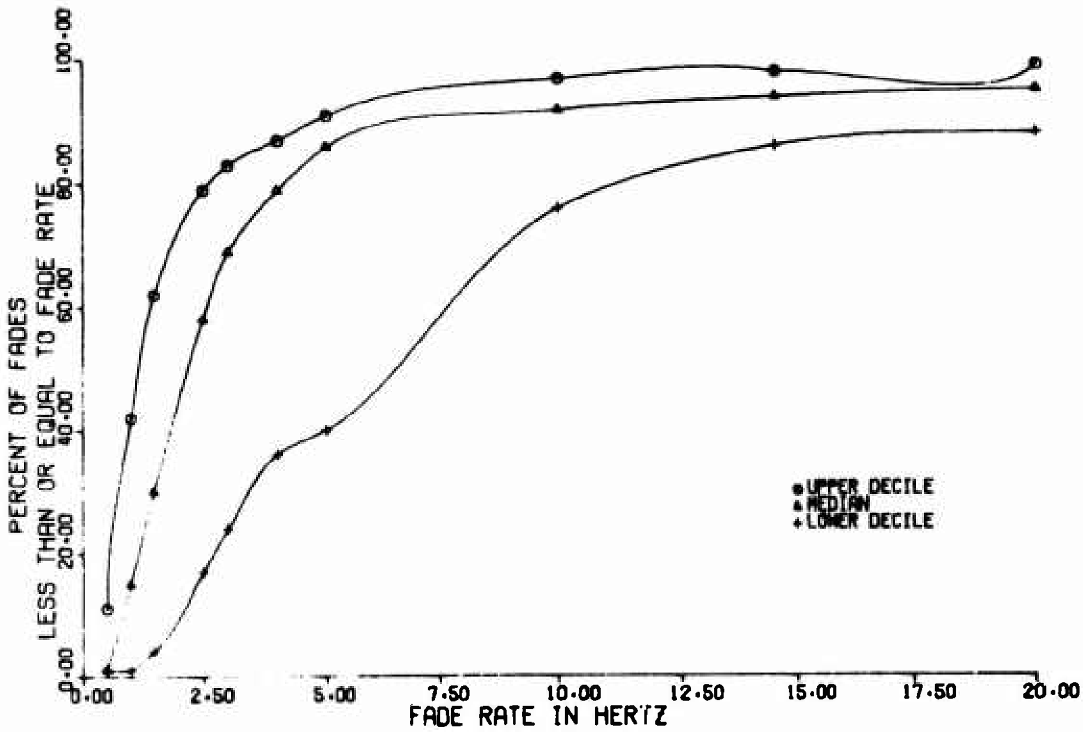


FADE RATE DISTRIBUTION

WHITFORD FIELD, NOVEMBER, X-BAND

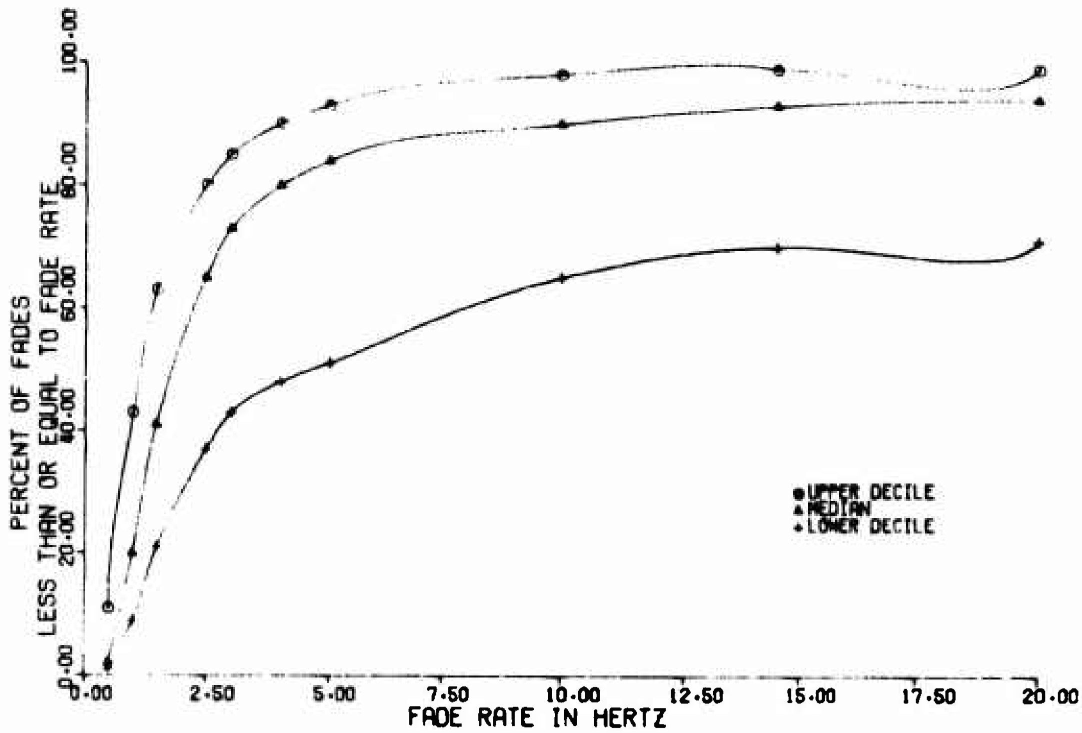
TEMPERATURE NOT OVER 49 DEGREES F., 44 TESTS

Figure 199.



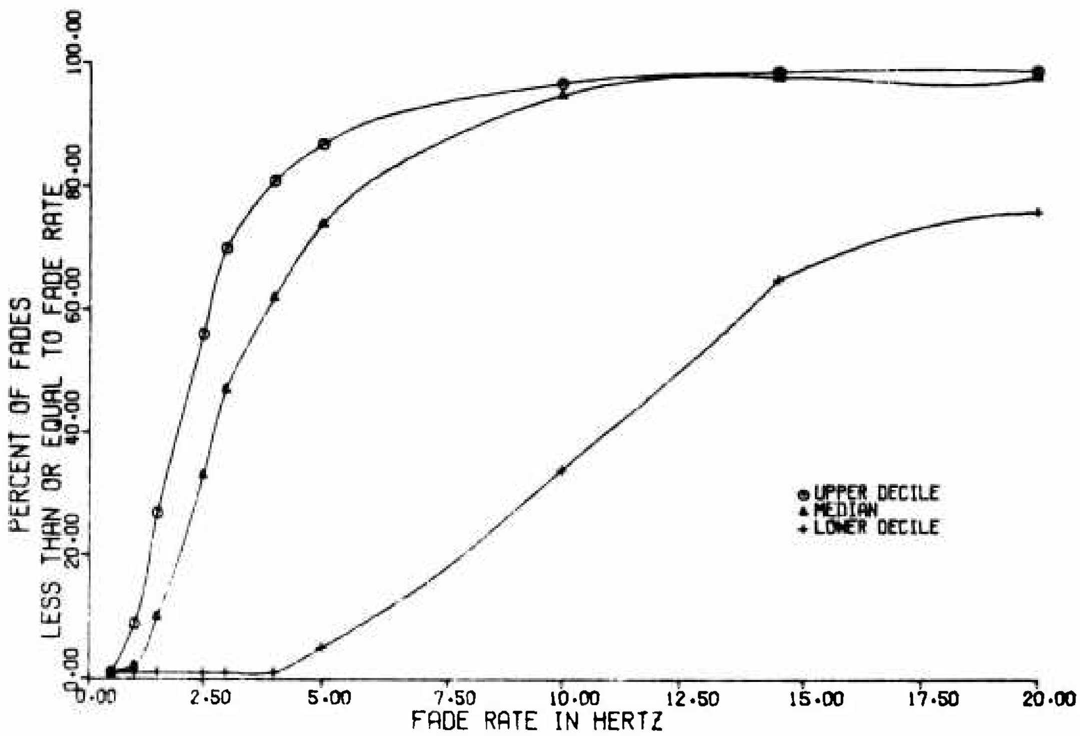
FADE RATE DISTRIBUTION
POINT PETRE, SEPTEMBER, C-BAND
TEMPERATURE OVER 67 DEGREES F., 37 TESTS

Figure 200.

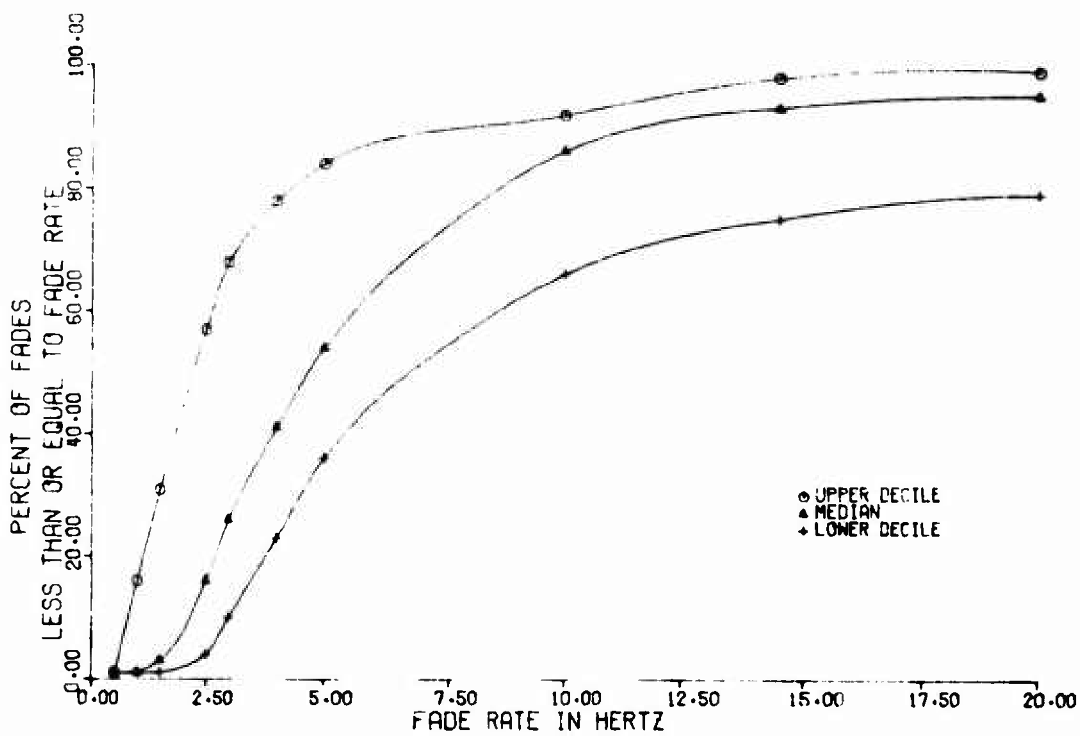


FADE RATE DISTRIBUTION
POINT PETRE, SEPTEMBER, C-BAND
TEMPERATURE NOT OVER 67 DEGREES F., 67 TESTS

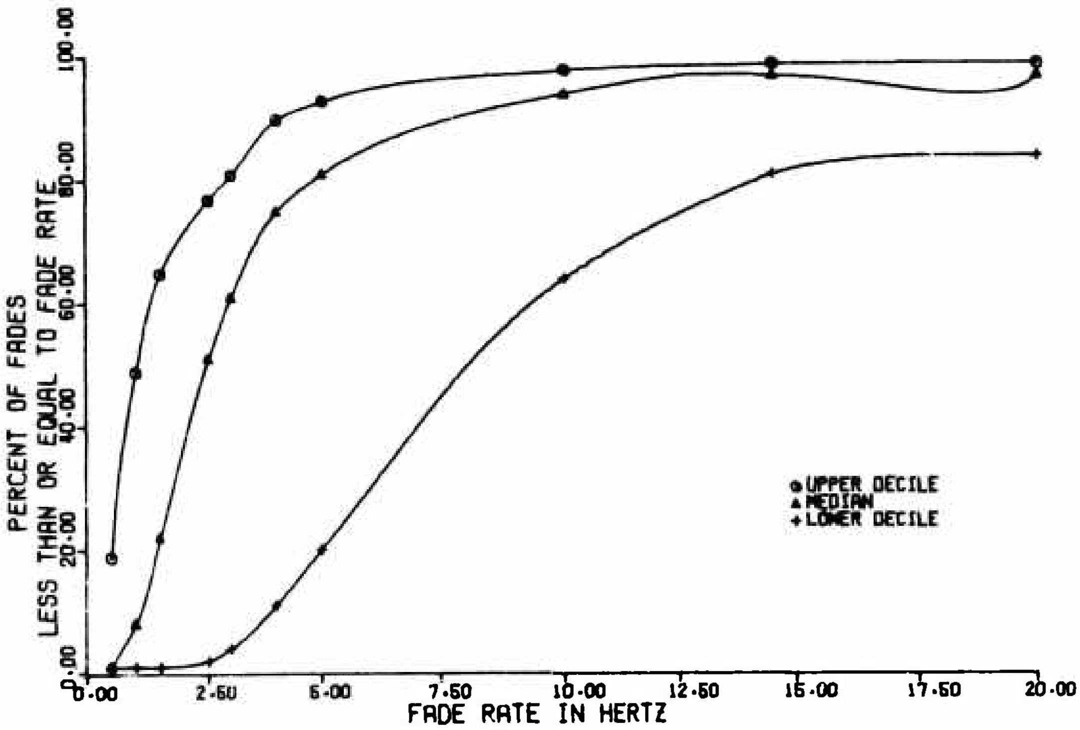
Figure 201.



FADE RATE DISTRIBUTION
WHITFORD FIELD, NOVEMBER, C-BAND
TEMPERATURE OVER 49 DEGREES F., 27 TESTS
Figure 202.



FADE RATE DISTRIBUTION
WHITFORD FIELD, NOVEMBER, C-BAND
TEMPERATURE NOT OVER 49 DEGREES F., 36 TESTS
Figure 203.

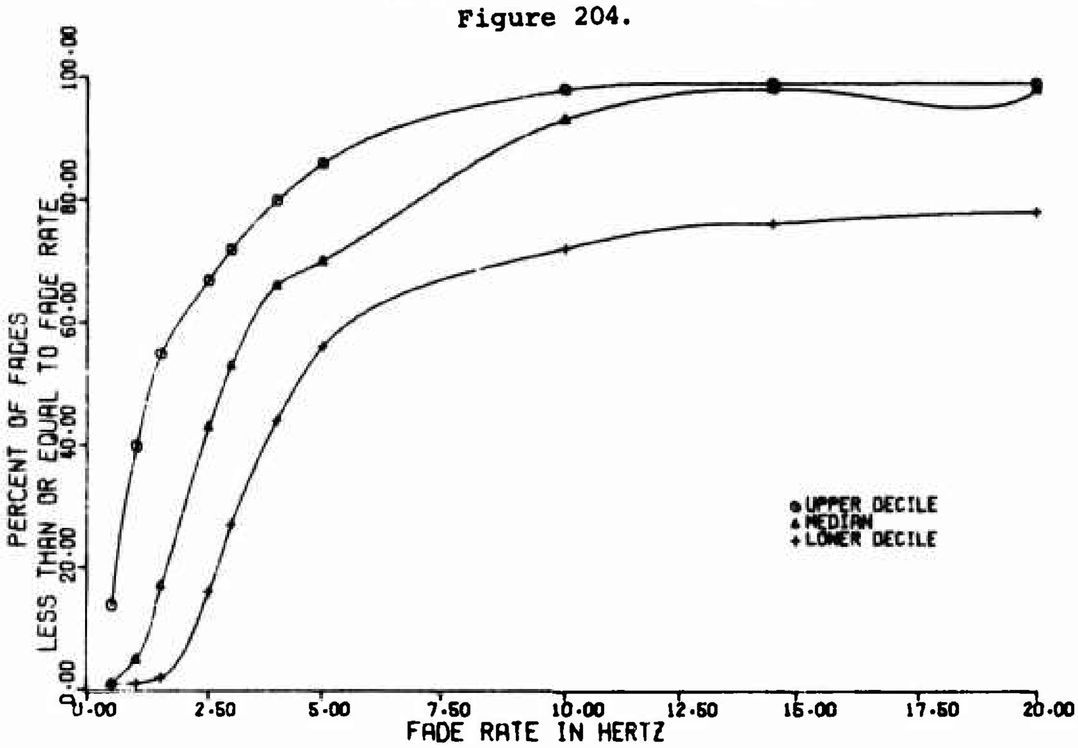


FADE RATE DISTRIBUTION

POINT PETRE, WINTER, C-BAND

TEMPERATURE OVER 21 DEGREES F., 47 TESTS

Figure 204.

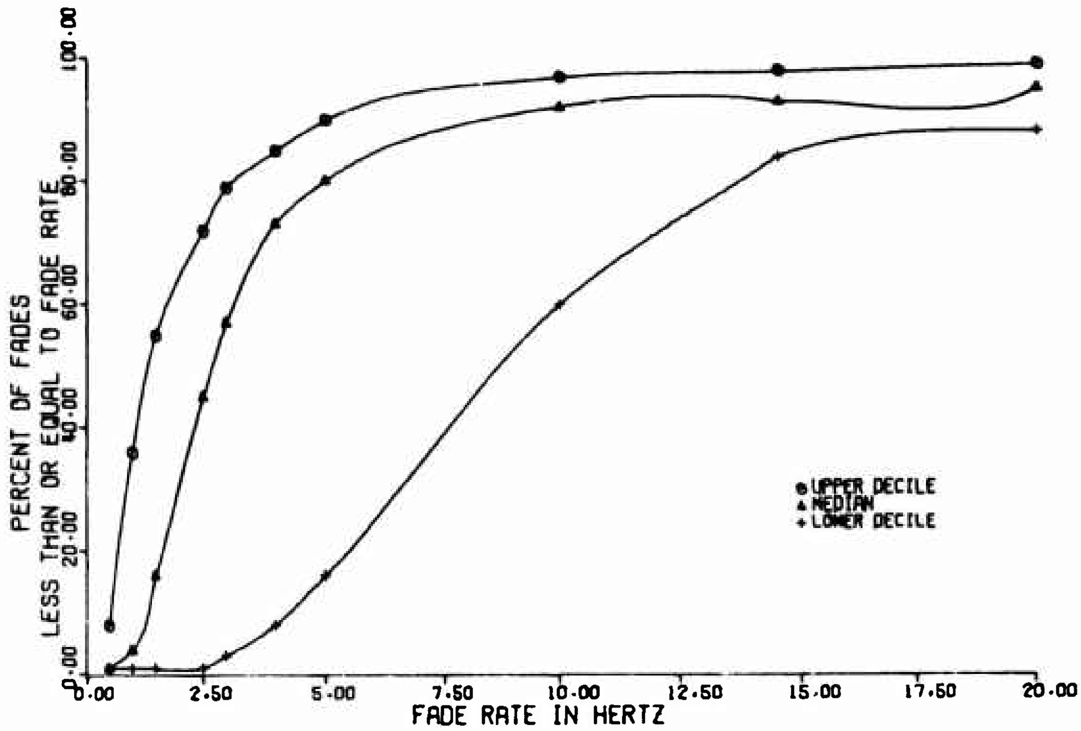


FADE RATE DISTRIBUTION

POINT PETRE, WINTER, C-BAND

TEMPERATURE NOT OVER 21 DEGREES F., 63 TESTS

Figure 205.

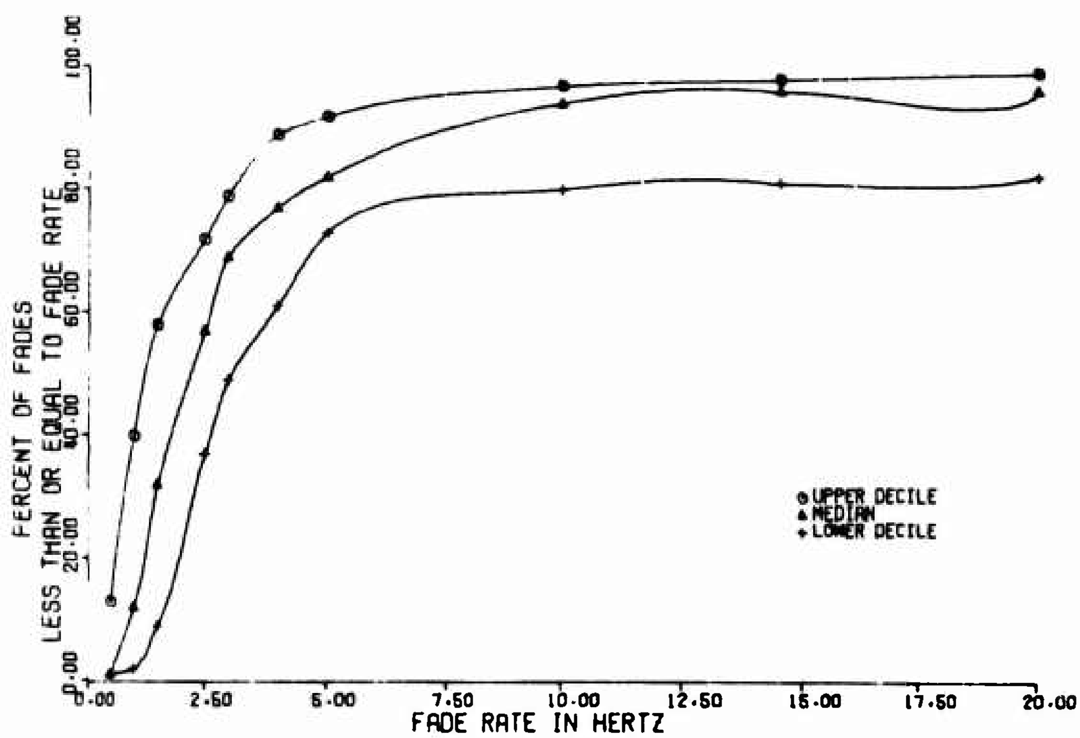


FADE RATE DISTRIBUTION

ONTARIO CENTER, WINTER, C-BAND

TEMPERATURE OVER 29 DEGREES F., 36 TESTS

Figure 206.

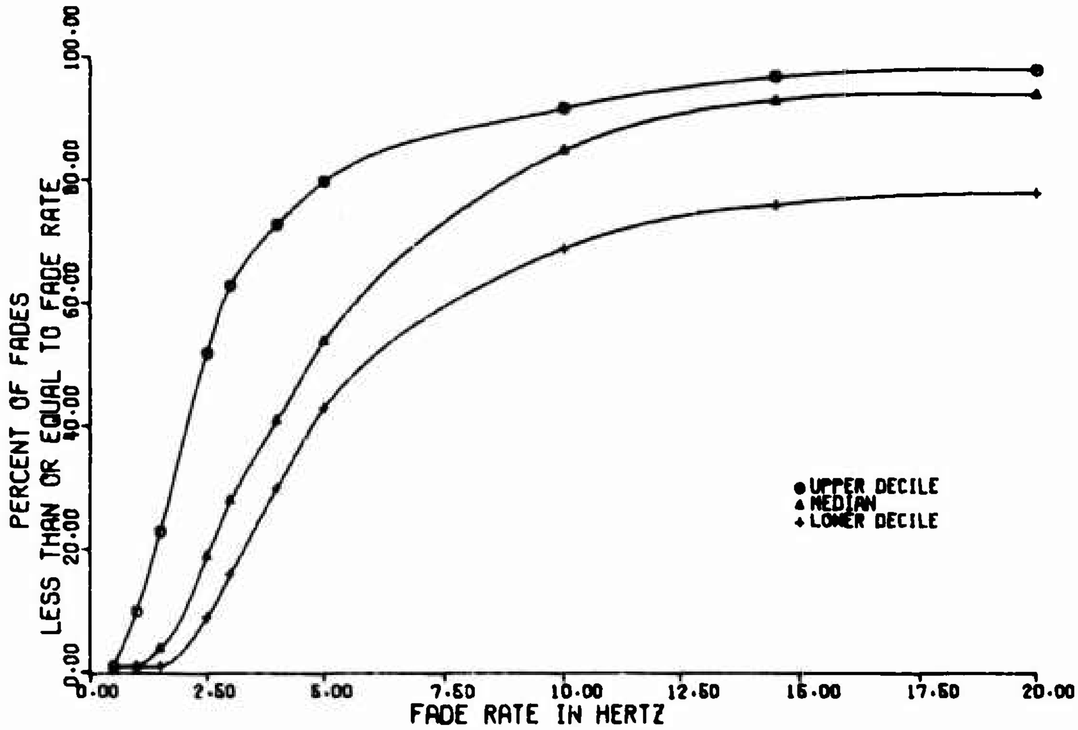


FADE RATE DISTRIBUTION

ONTARIO CENTER, WINTER, C-BAND

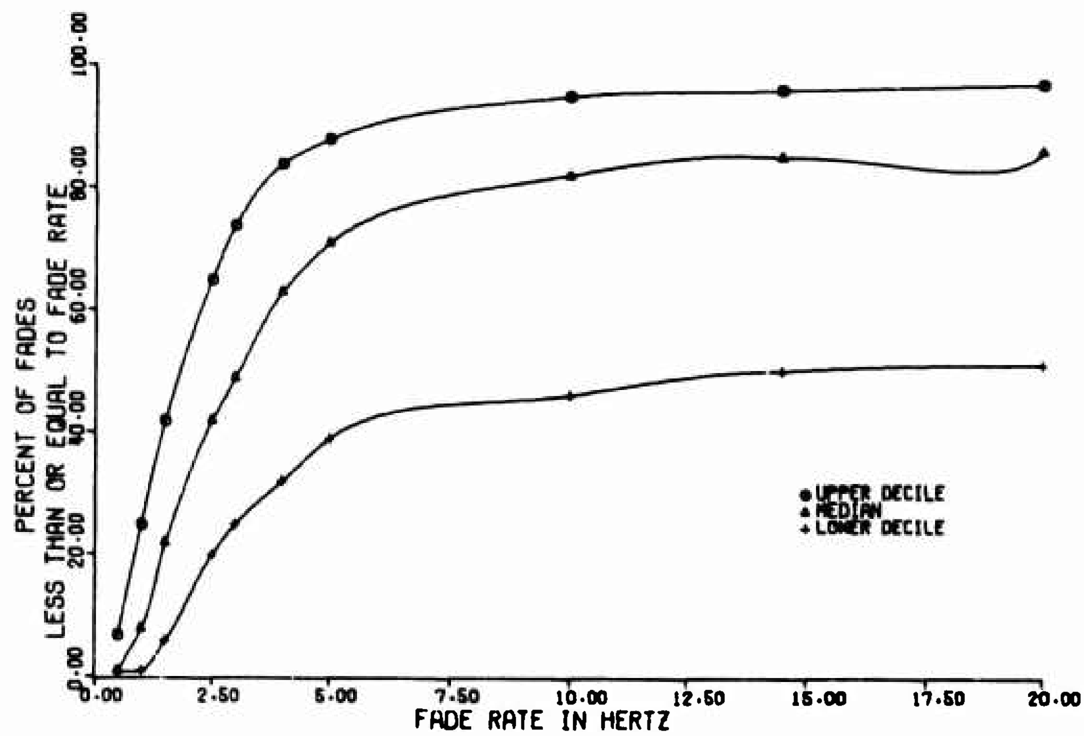
TEMPERATURE NOT OVER 29 DEGREES F., 33 TESTS

Figure 207.



FADE RATE DISTRIBUTION
PORT BYRON, FEBRUARY, C-BAND
TEMPERATURE OVER 33 DEGREES F., 36 TESTS

Figure 208.



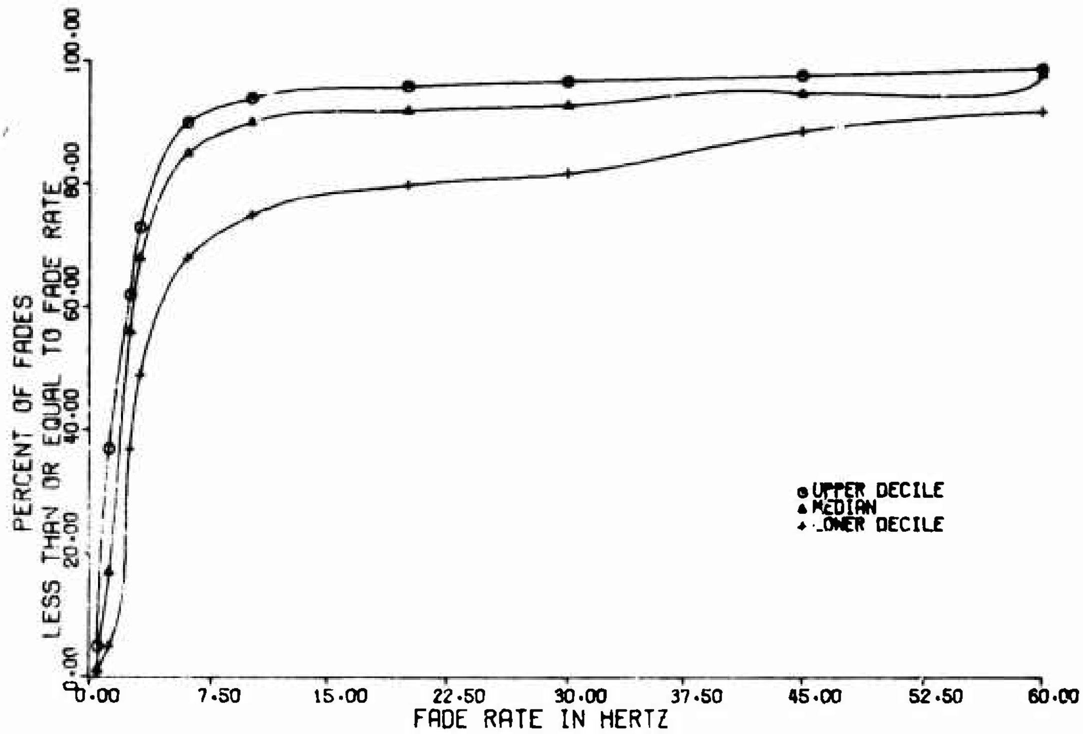
FADE RATE DISTRIBUTION
PORT BYRON, FEBRUARY, C-BAND
TEMPERATURE NOT OVER 33 DEGREES F., 39 TESTS

Figure 209.

3. Fade Rate Distributions - Diurnal Effects

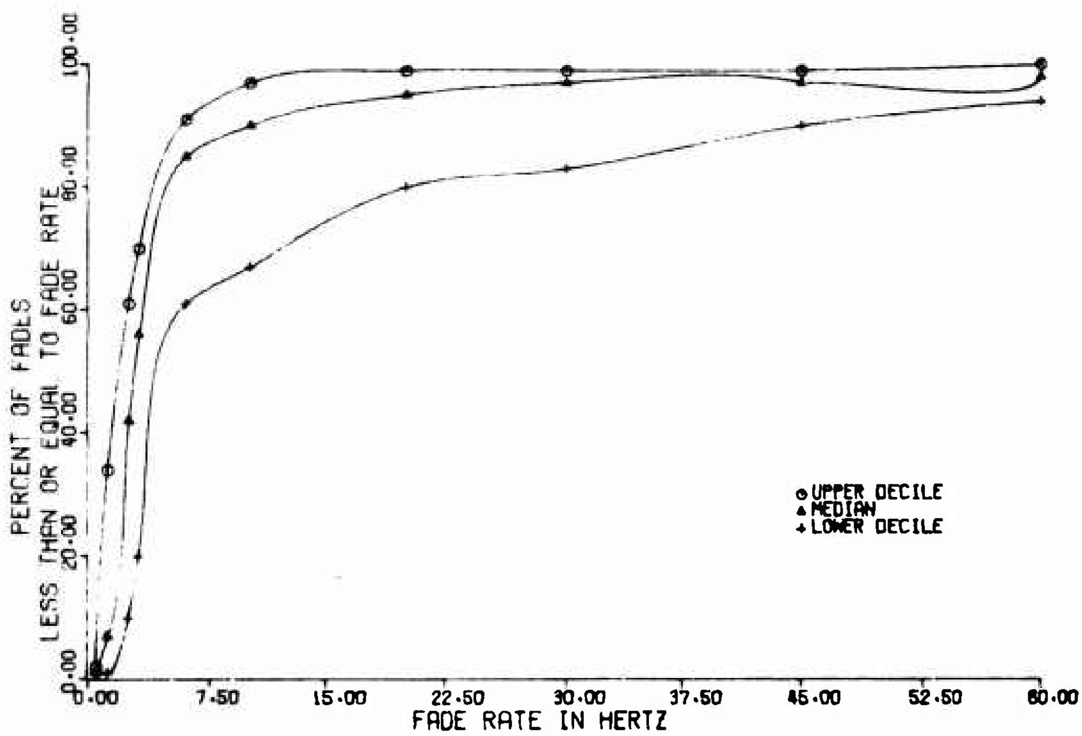
In a format similar to subsection VI-B-1, Figures 210 through 226 give the observed fade rate distributions but subdivided into data for four six hour periods through the day. These are 0001-0600, 0601-1200, 1201-1800, and 1801-2400 as shown in the figures. The data included in three of the figures contained too few tests to allow a computation of the deciles.

The first three figures are based on X-band data, the last 14 on C-band. Only a representative sample is given here. A common feature of many of the plots, including those not shown here, is a tendency for the median fade rate at both X- and C-band to be slightly greater during the evening hours. There are exceptions to this finding, however, as is evident in the Point Petre data.



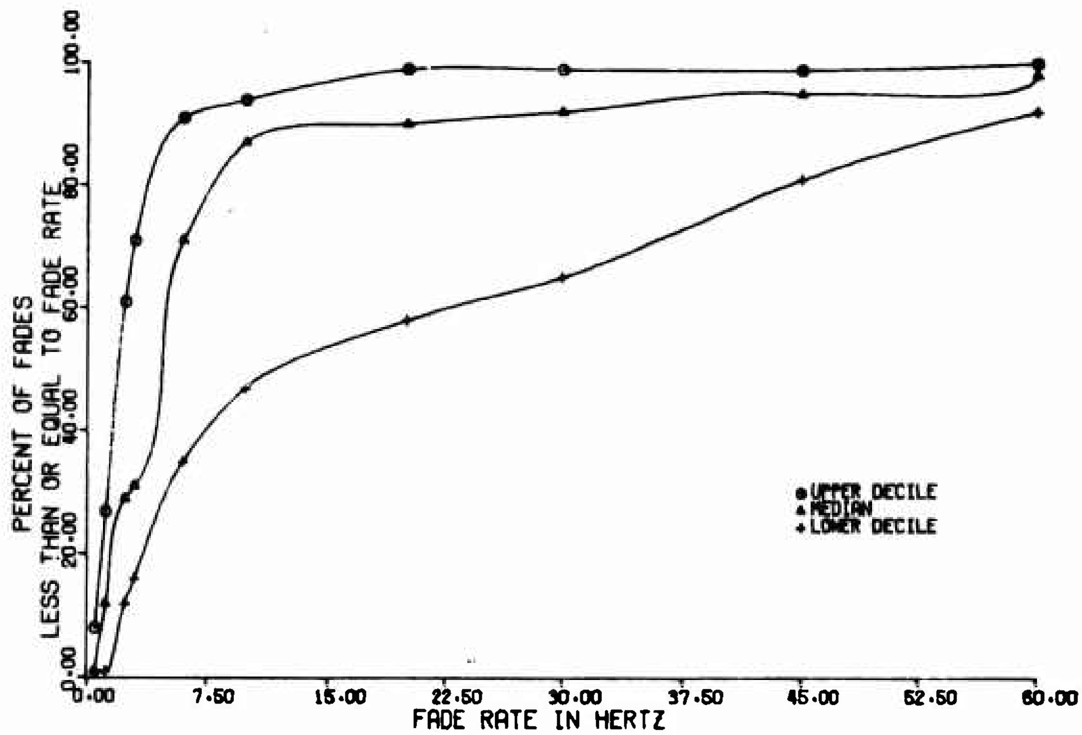
FADE RATE DISTRIBUTION
ONTARIO CENTER, SUMMER, X-BAND
FROM 0601 TO 1200, 20 TESTS

Figure 210.



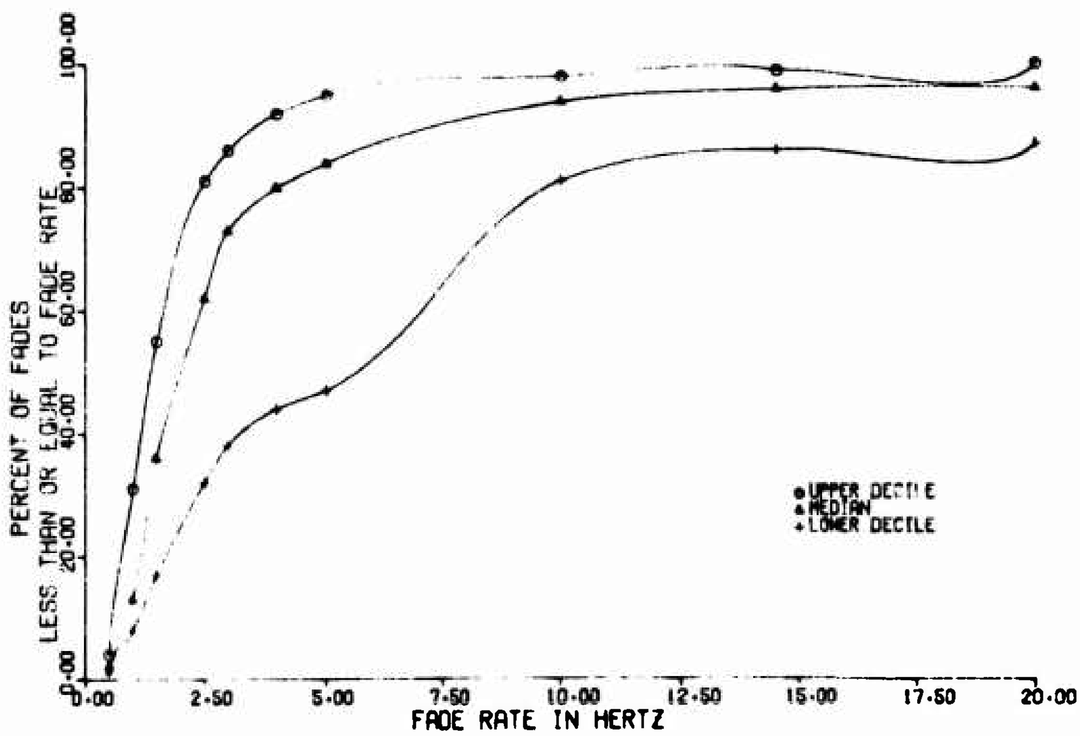
FADE RATE DISTRIBUTION
ONTARIO CENTER, SUMMER, X-BAND
FROM 1201 TO 1800, 34 TESTS

Figure 211.



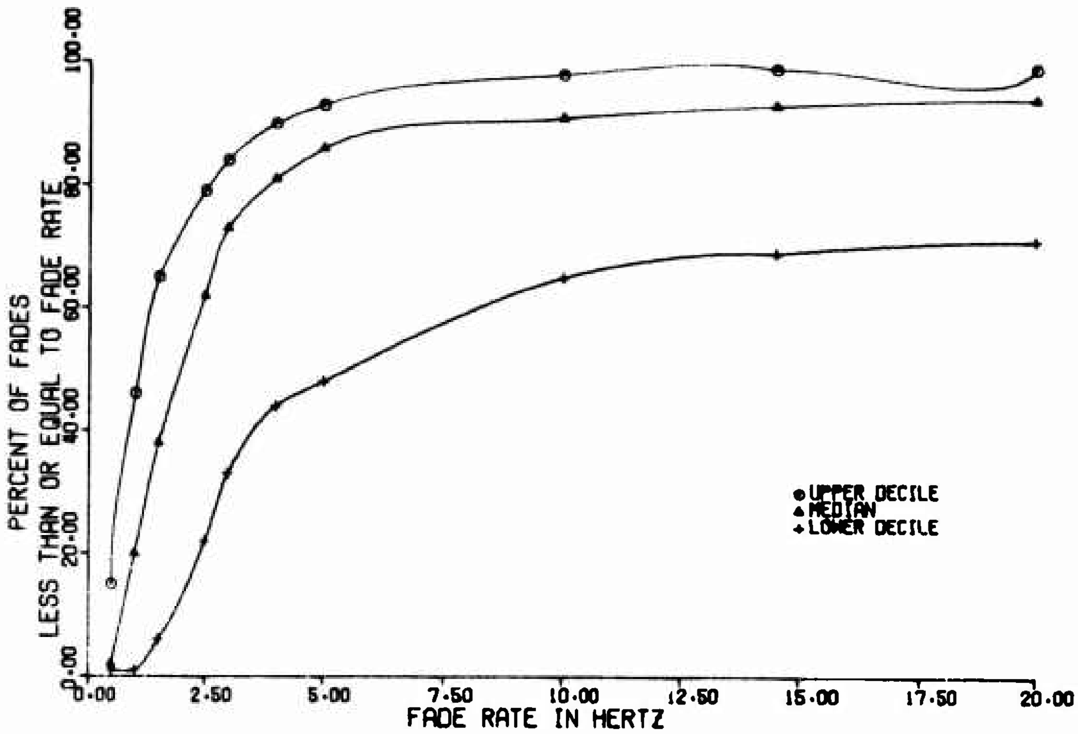
FADE RATE DISTRIBUTION
ONTARIO CENTER, SUMMER, X-BAND
FROM 1801 TO 2400, 34 TESTS

Figure 212.



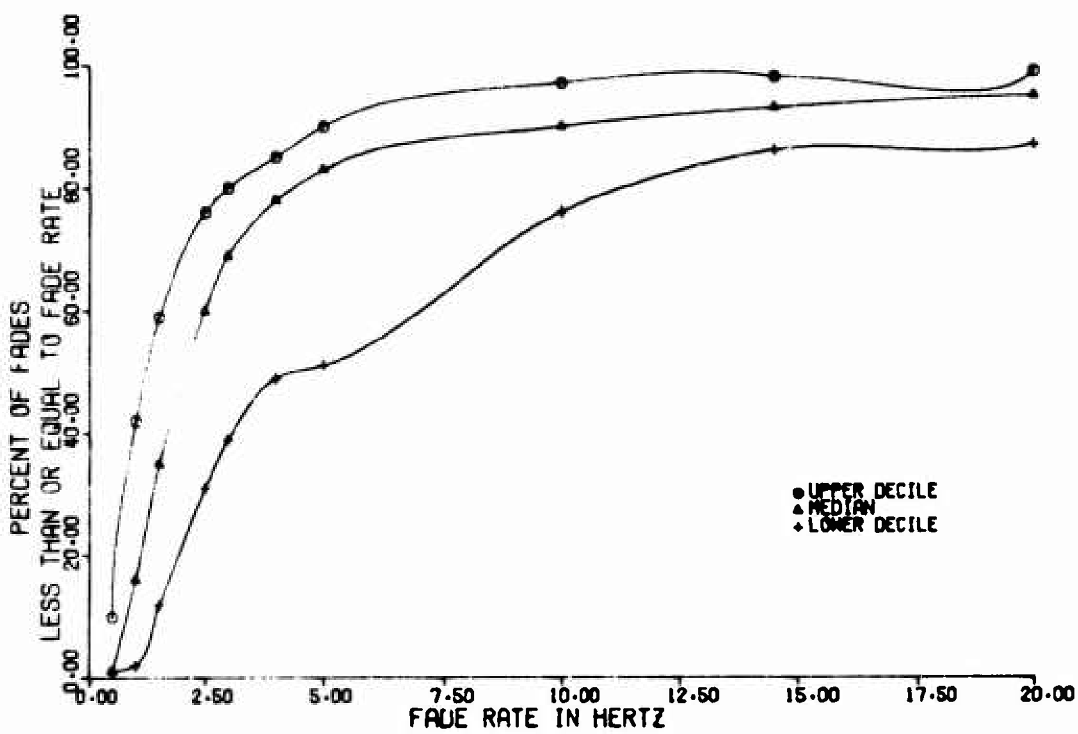
FADE RATE DISTRIBUTION
POINT PETRE, SEPTEMBER, C-BAND
FROM 0001 TO 0600, 15 TESTS

Figure 213.



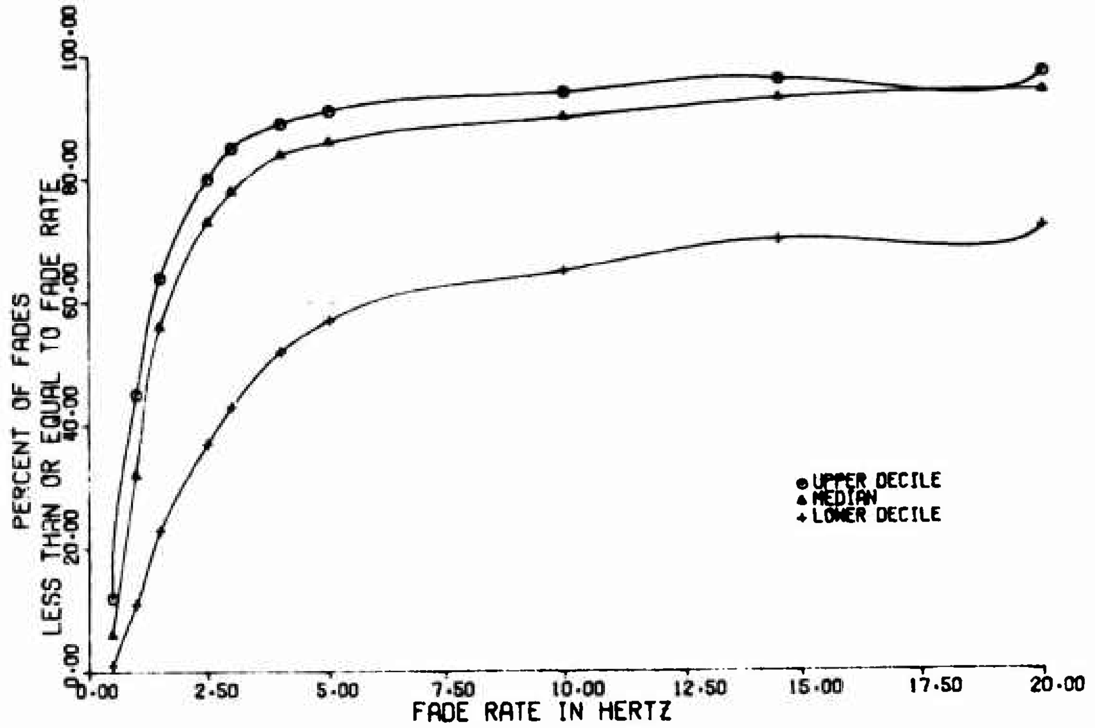
FADE RATE DISTRIBUTION
POINT PETRE, SEPTEMBER, C-BAND
FROM 0601 TO 1200, 42 TESTS

Figure 214.



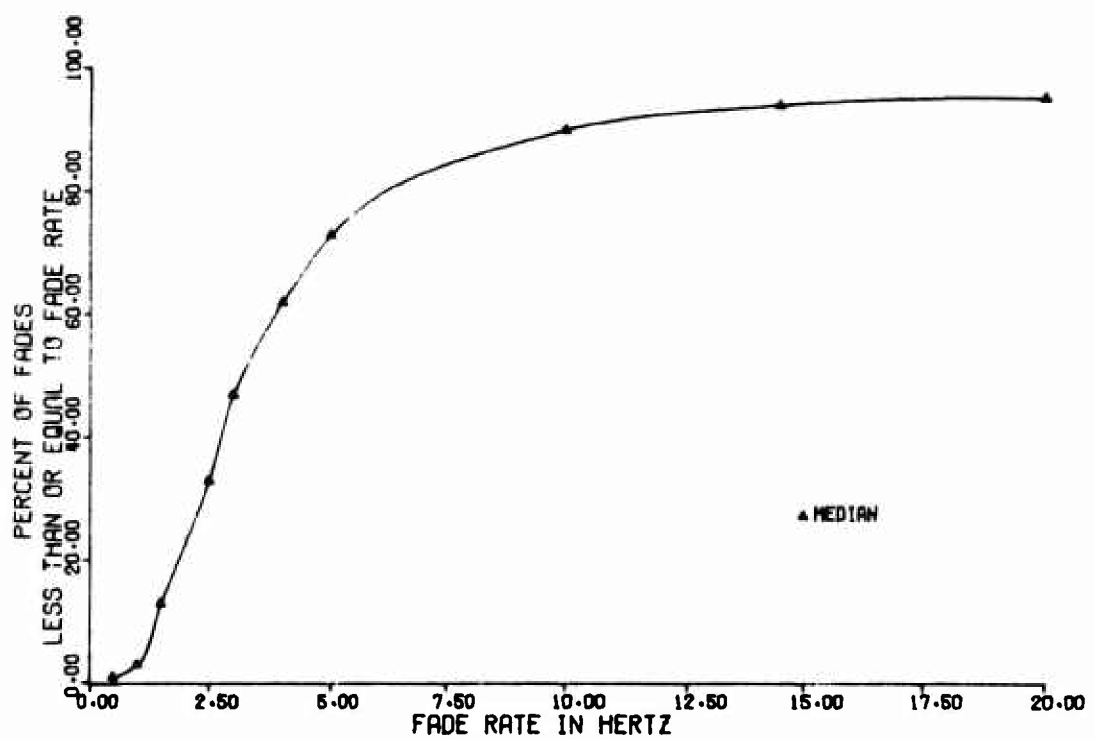
FADE RATE DISTRIBUTION
POINT PETRE, SEPTEMBER, C-BAND
FROM 1201 TO 1800, 36 TESTS

Figure 215.



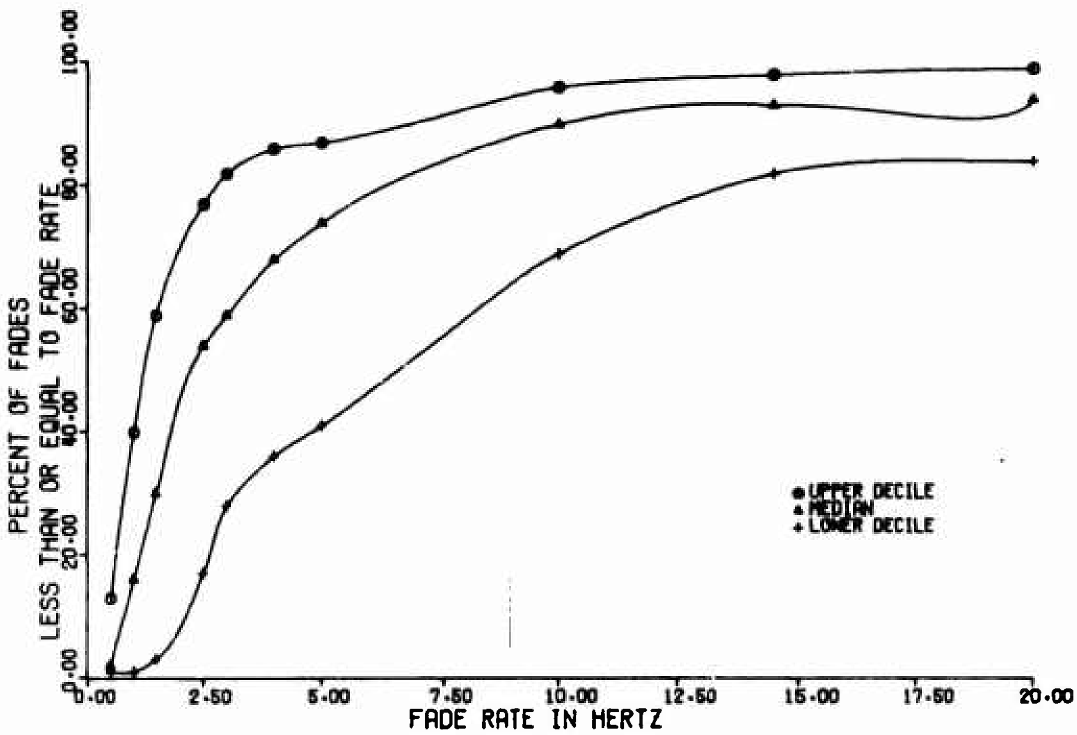
FADE RATE DISTRIBUTION
POINT PETRE, SEPTEMBER, C-BAND
FROM 1801 TO 2400, 11 TESTS

Figure 216.

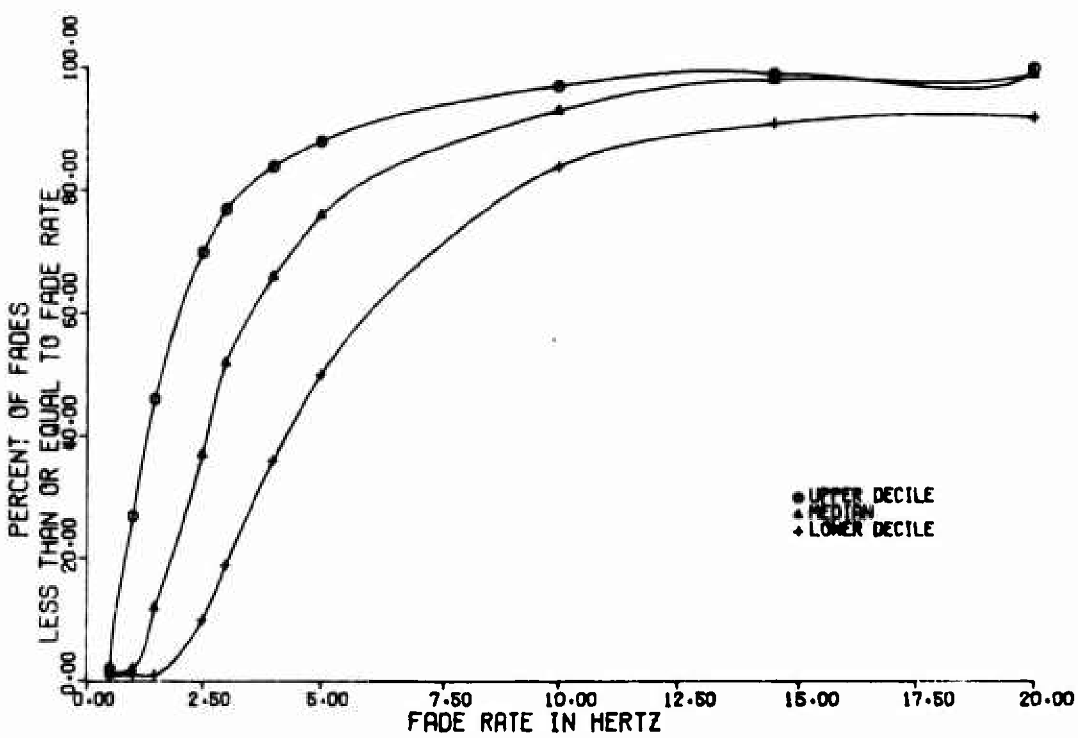


FADE RATE DISTRIBUTION
ONTARIO CENTER, OCTOBER, C-BAND
FROM 0001 TO 0600, 5 TESTS

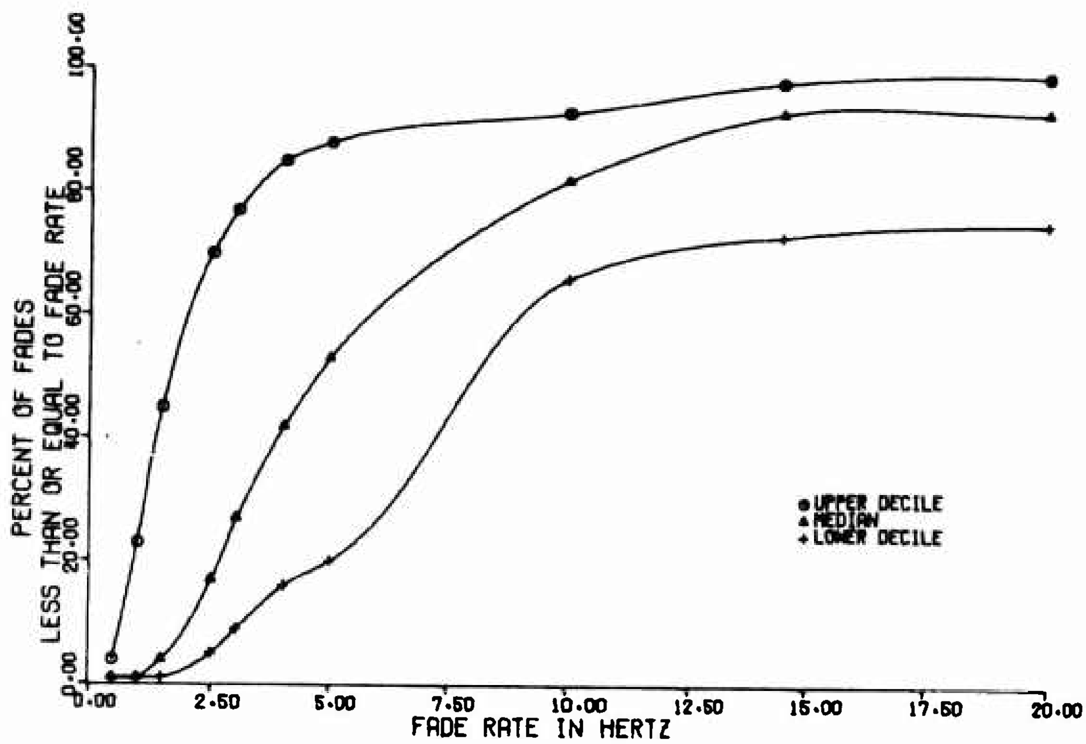
Figure 217.



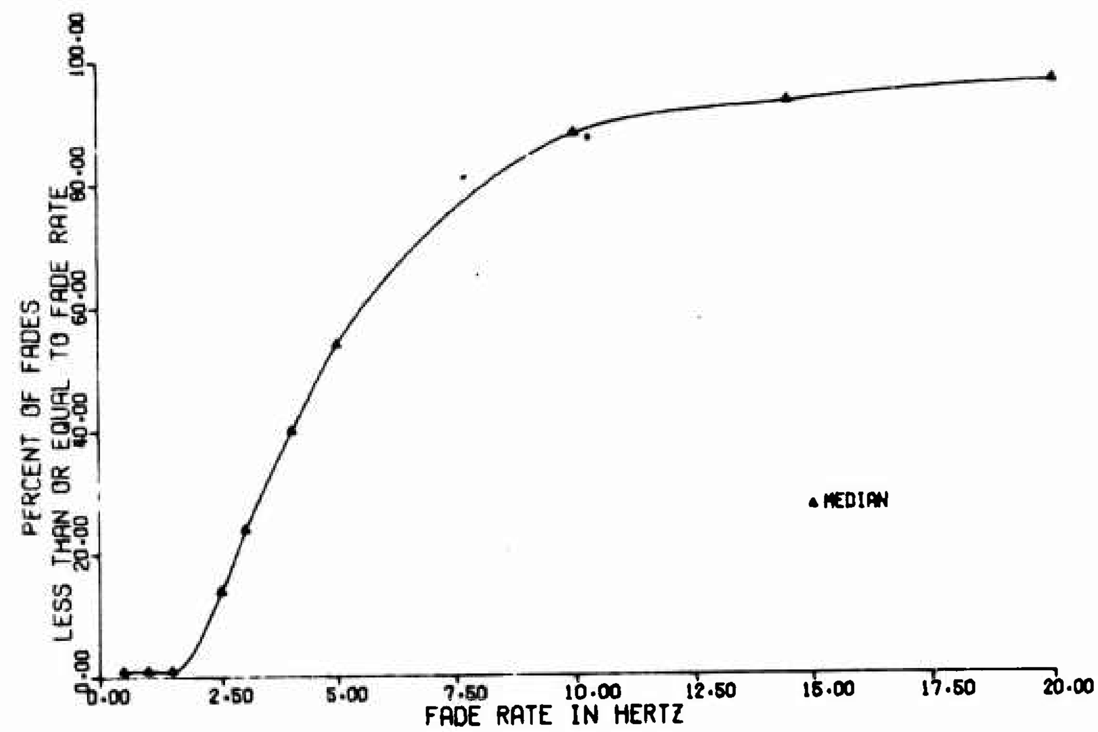
FADE RATE DISTRIBUTION
ONTARIO CENTER, OCTOBER, C-BAND
FROM 0601 TO 1200, 36 TESTS
Figure 218.



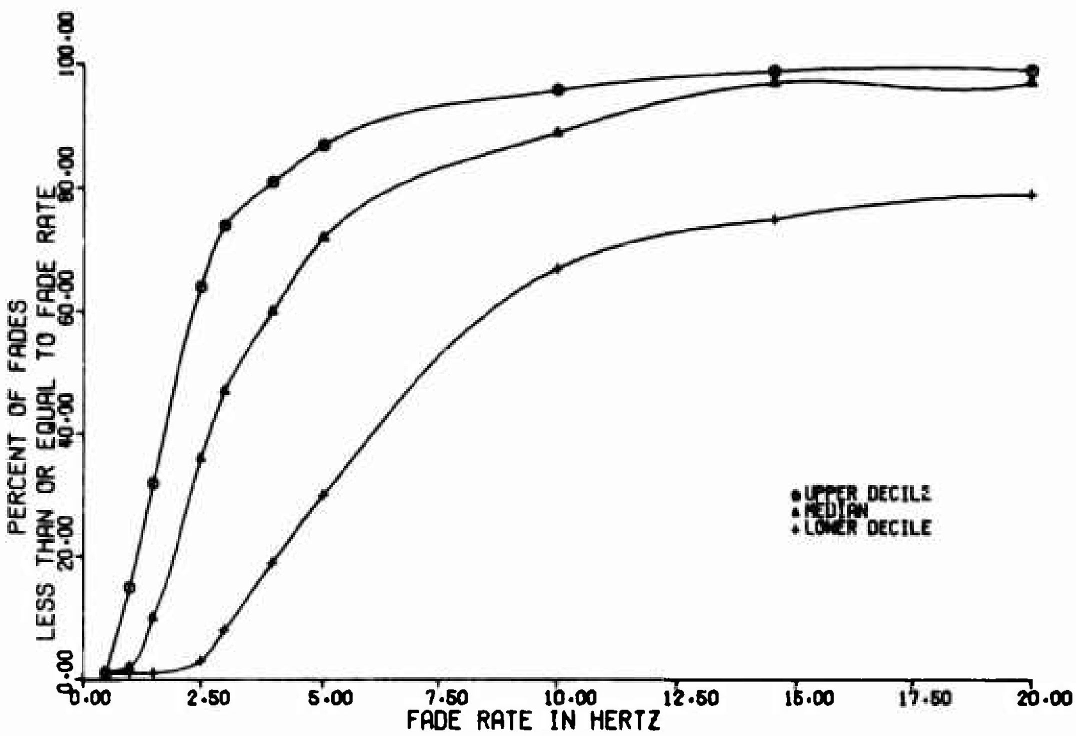
FADE RATE DISTRIBUTION
ONTARIO CENTER, OCTOBER, C-BAND
FROM 1201 TO 1800, 61 TESTS
Figure 219.



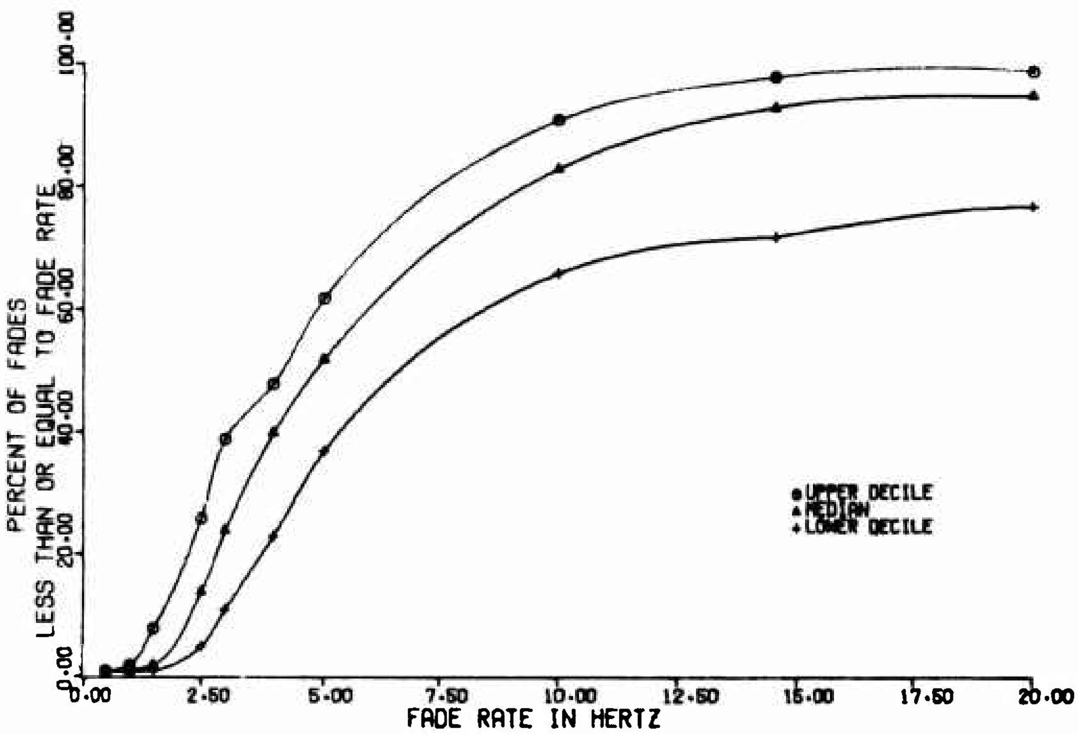
FADE RATE DISTRIBUTION
ONTARIO CENTER, OCTOBER, C-BAND
FROM 1801 TO 2400, 25 TESTS
Figure 220.



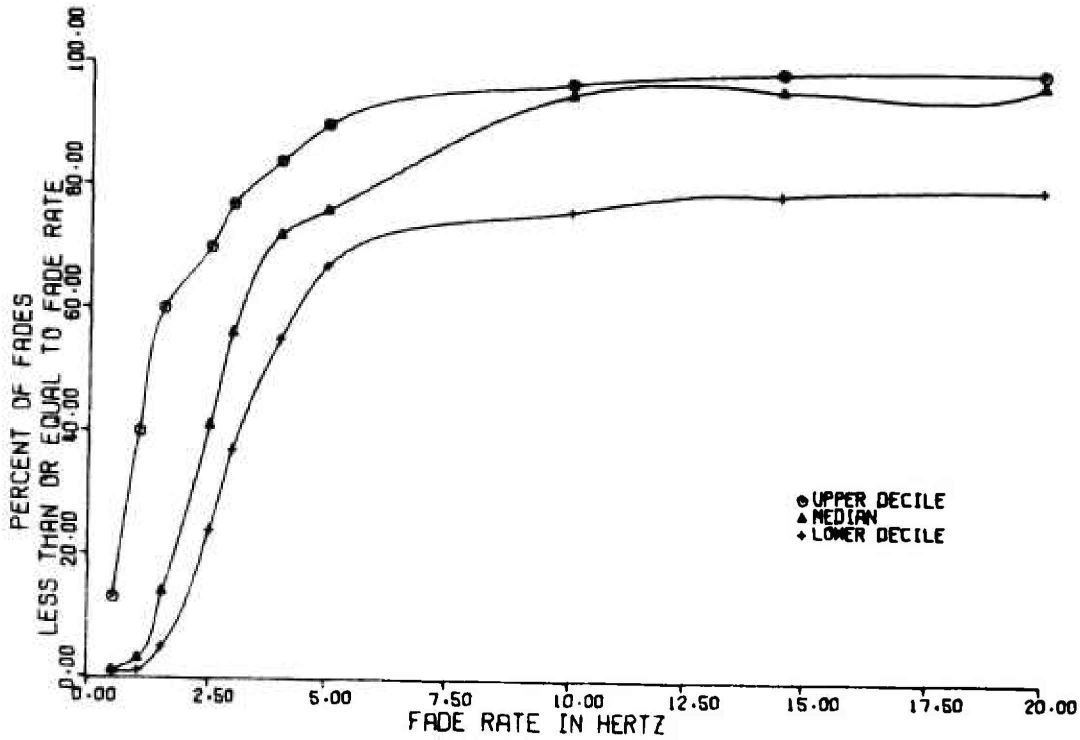
FADE RATE DISTRIBUTION
WHITFORD FIELD, NOVEMBER, C-BAND
FROM 0601 TO 1200, 8 TESTS
Figure 221.



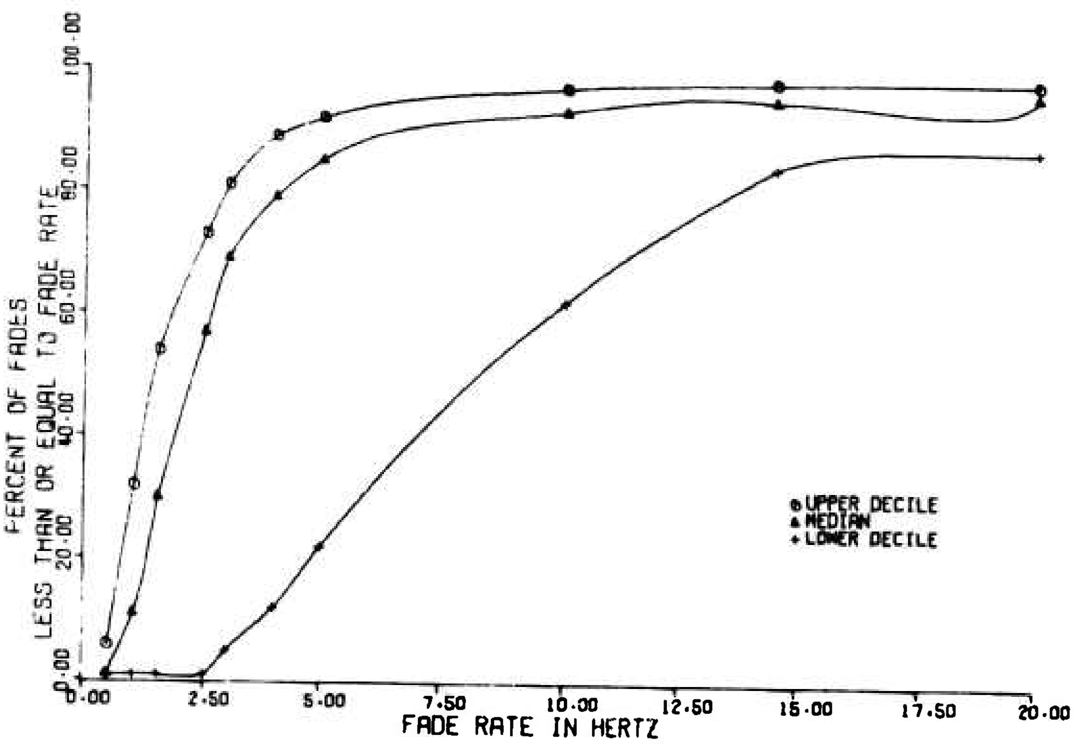
FADE RATE DISTRIBUTION
WHITFORD FIELD, NOVEMBER, C-BAND
FROM 1201 TO 1800, 41 TESTS
Figure 222.



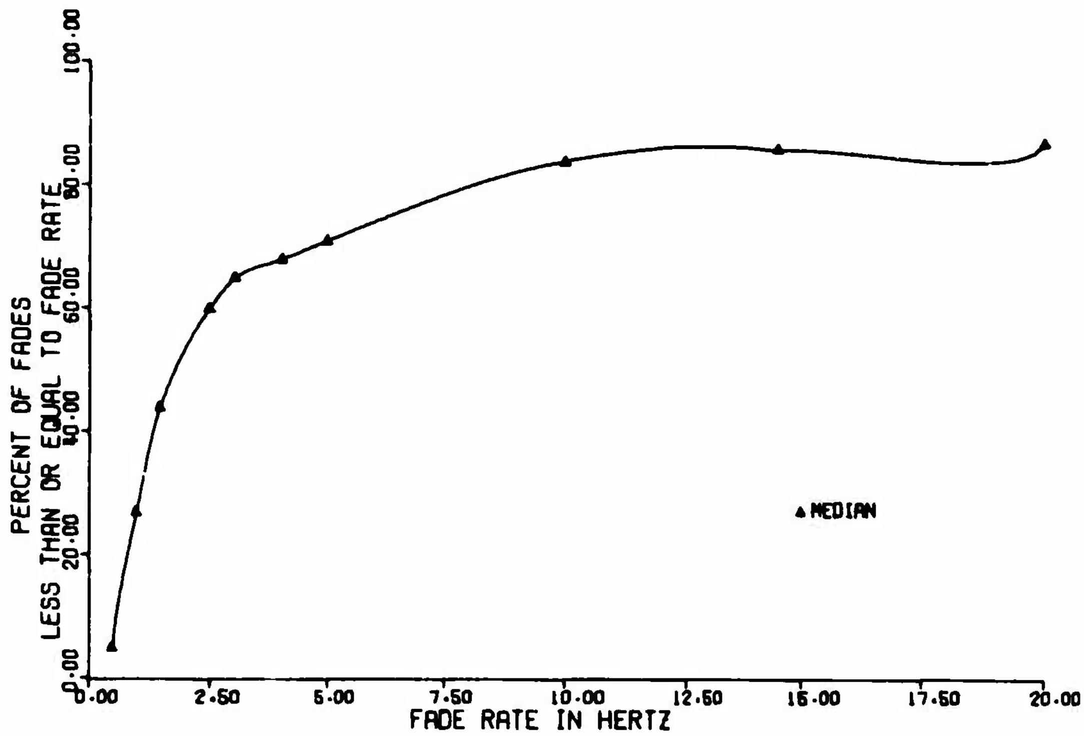
FADE RATE DISTRIBUTION
WHITFORD FIELD, NOVEMBER, C-BAND
FROM 1801 TO 2400, 13 TESTS
Figure 223.



FADE RATE DISTRIBUTION
ONTARIO CENTER, WINTER, C-BAND
FROM 0601 TO 1200, 18 TESTS
Figure 224.



FADE RATE DISTRIBUTION
ONTARIO CENTER, WINTER, C-BAND
FROM 1201 TO 1800, 46 TESTS
Figure 225.



FADE RATE DISTRIBUTION
ONTARIO CENTER, WINTER, C-BAND
FROM 1801 TO 2400, 6 TESTS

Figure 226.

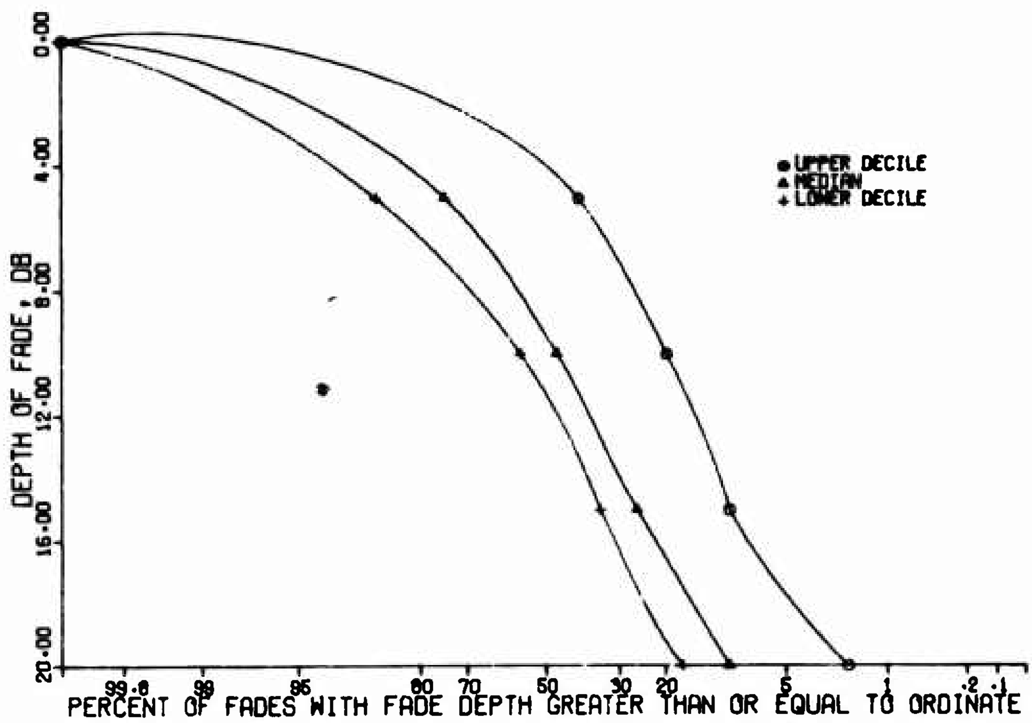
C. DEPTH OF FADE DISTRIBUTIONS

Fade depth distributions are shown in Figures 227 through 253. On all of these plots cumulative percentage is plotted on a normal probability scale. A fade was indicated by any drop in level from the median signal level, the median being established for blocks of 2000 samples. Only typical examples of temperature and diurnal effects on these kinds of data are shown. For those plots which are omitted from this report, either the spread of values corresponds closely to the included "All" plots or the range of values is similar to the included temperature and diurnal effect plots. The comparative spread of values is shown on the summary bar graphs at the end of this section.

1. Overall Depth of Fade Distributions

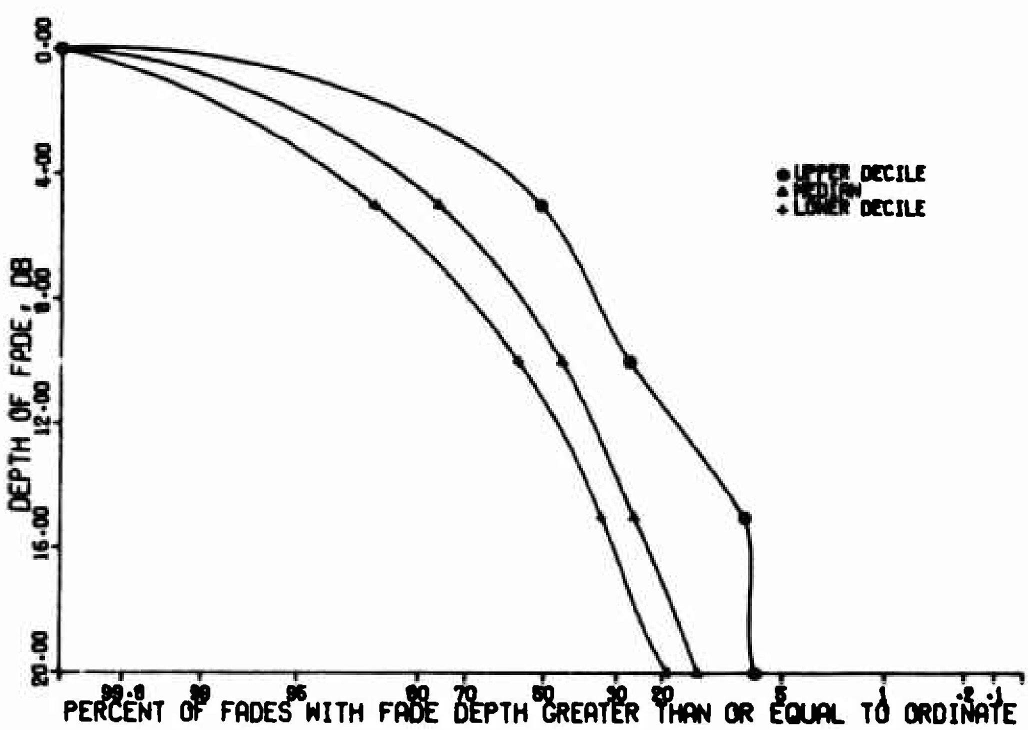
Figures 227 through 242 give the overall fade depth distributions over the four paths. In addition to the median for all tests included, the upper and lower deciles are plotted where justified by sufficient data. The number of tests for each distribution is shown on the figures.

For all paths the depth of fade distributions are similar and show no seasonal or frequency dependence. The observed median fade depth was approximately 11 dB. On the average less than 10 percent of all fades exceeded 20 dB.



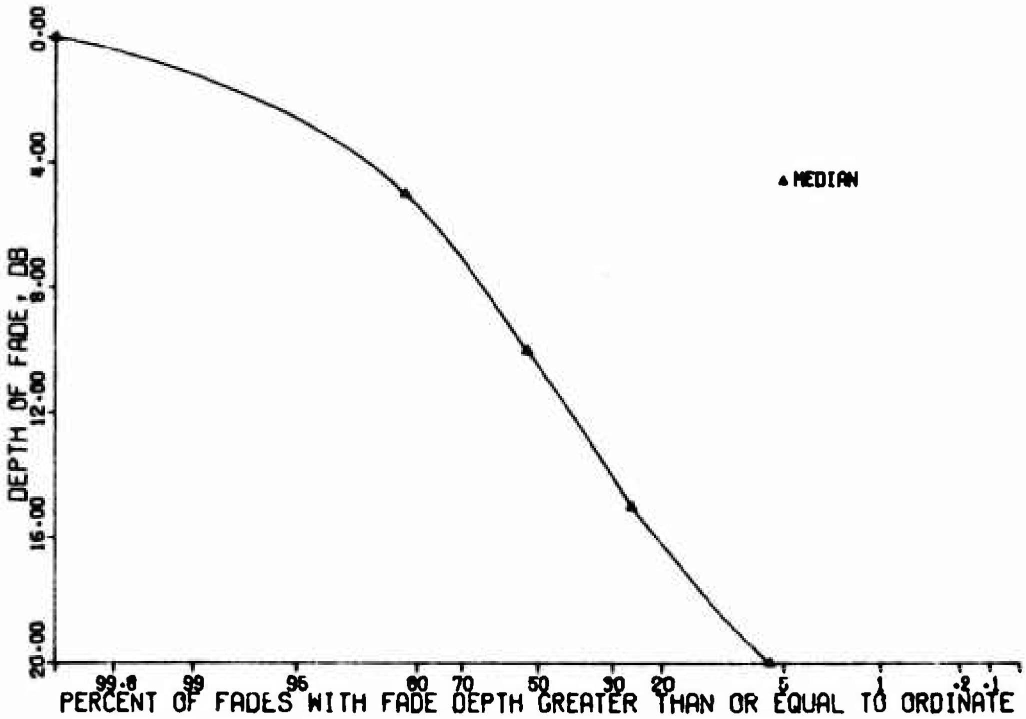
DISTRIBUTION OF DEPTH OF FADES
ONTARIO CENTER, SUMMER, X-BAND
ALL, 64 TESTS

Figure 227.



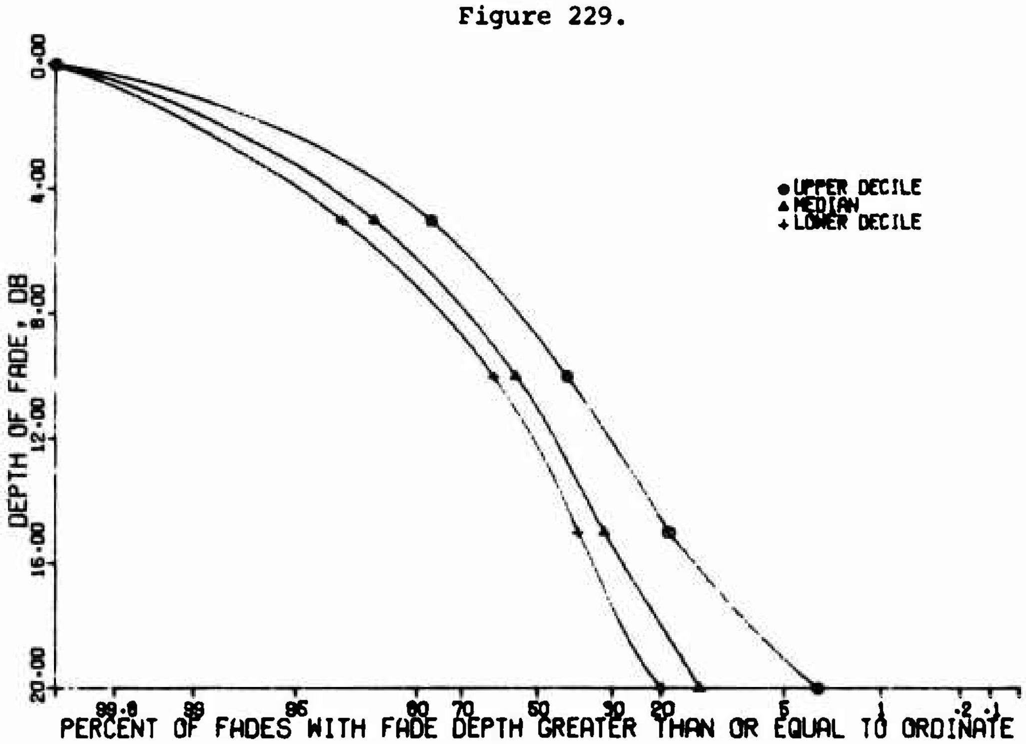
DISTRIBUTION OF DEPTH OF FADES
ONTARIO CENTER, SUMMER, C-BAND
ALL, 43 TESTS

Figure 228.



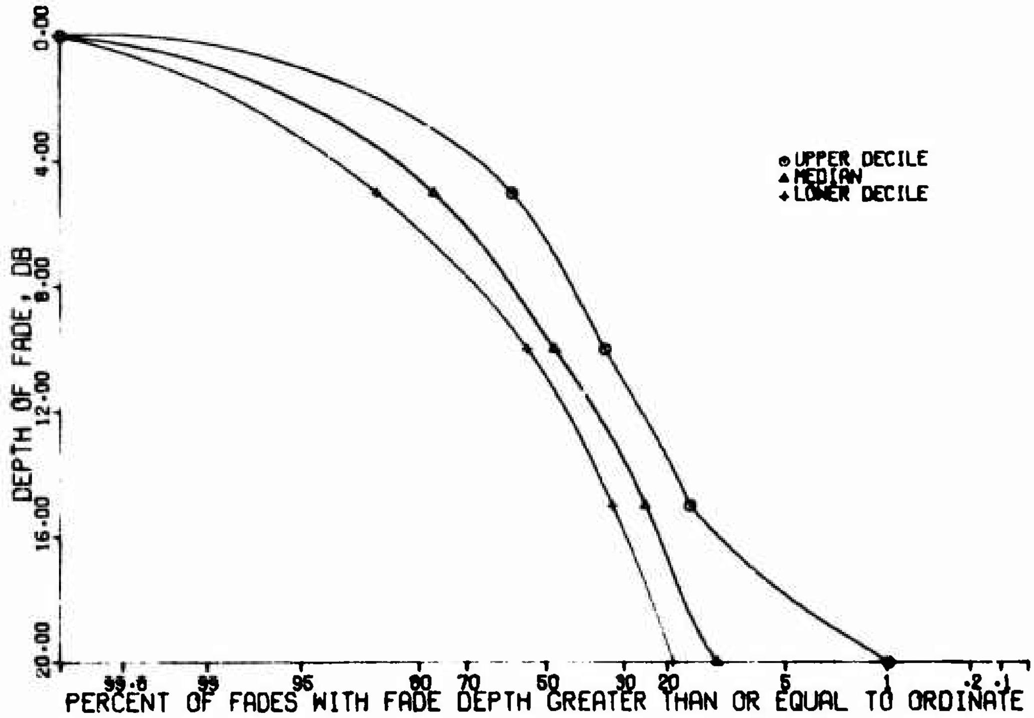
DISTRIBUTION OF DEPTH OF FADES
WHITFORD FIELD, SUMMER, X-BAND
ALL, 7 TESTS

Figure 229.



DISTRIBUTION OF DEPTH OF FADES
WHITFORD FIELD, SUMMER, C-BAND
ALL, 13 TESTS

Figure 230.

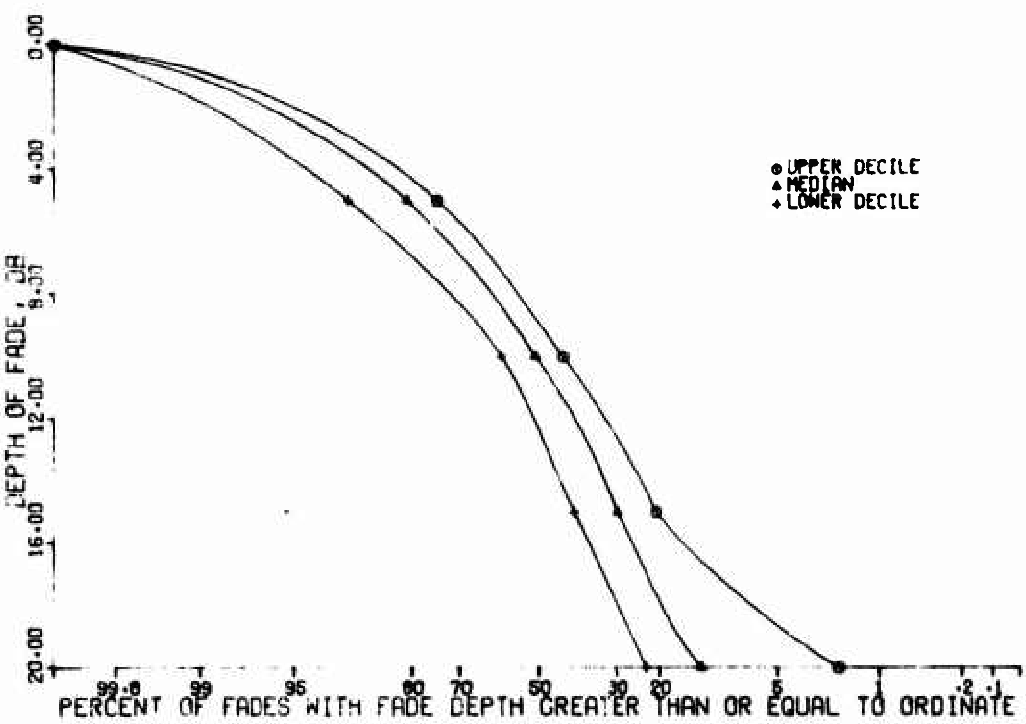


DISTRIBUTION OF DEPTH OF FADES

POINT PETRE, SEPTEMBER, X-BAND

ALL, 62 TESTS

Figure 231.

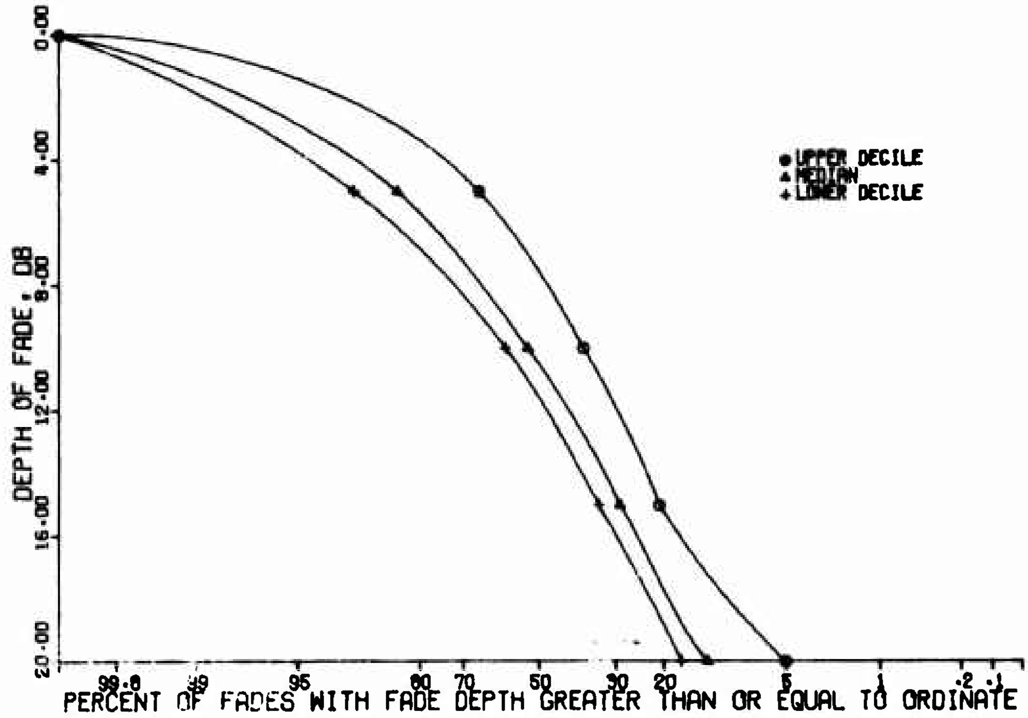


DISTRIBUTION OF DEPTH OF FADES

POINT PETRE, SEPTEMBER, C-BAND

ALL, 57 TESTS

Figure 232.

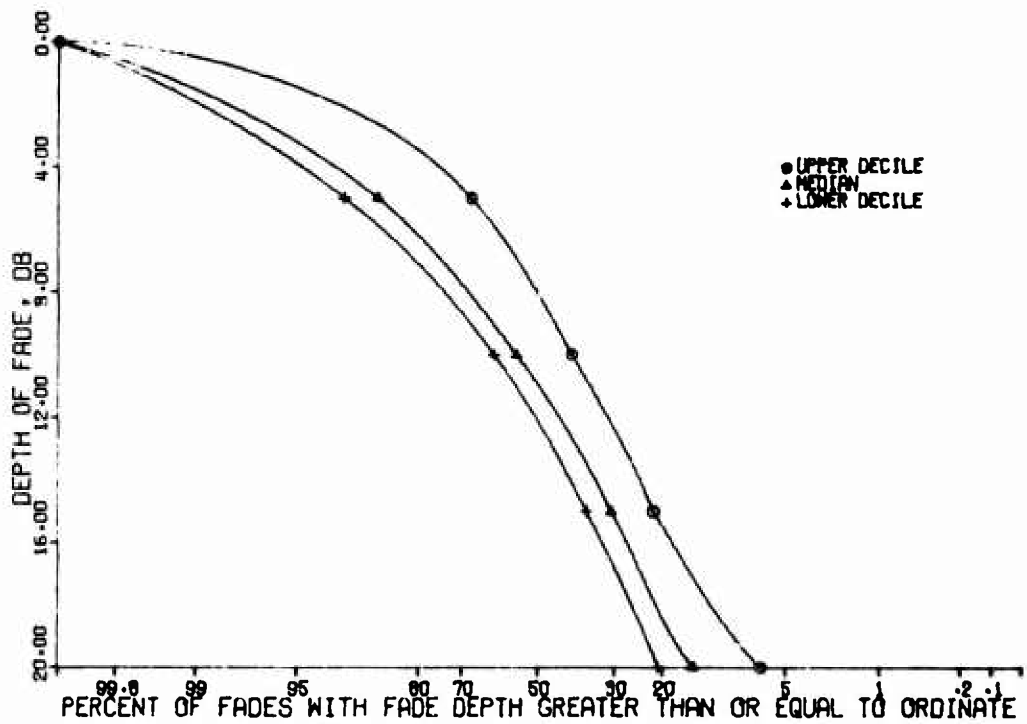


DISTRIBUTION OF DEPTH OF FADES

ONTARIO CENTER, OCTOBER, X-BAND

ALL, 108 TESTS

Figure 233.

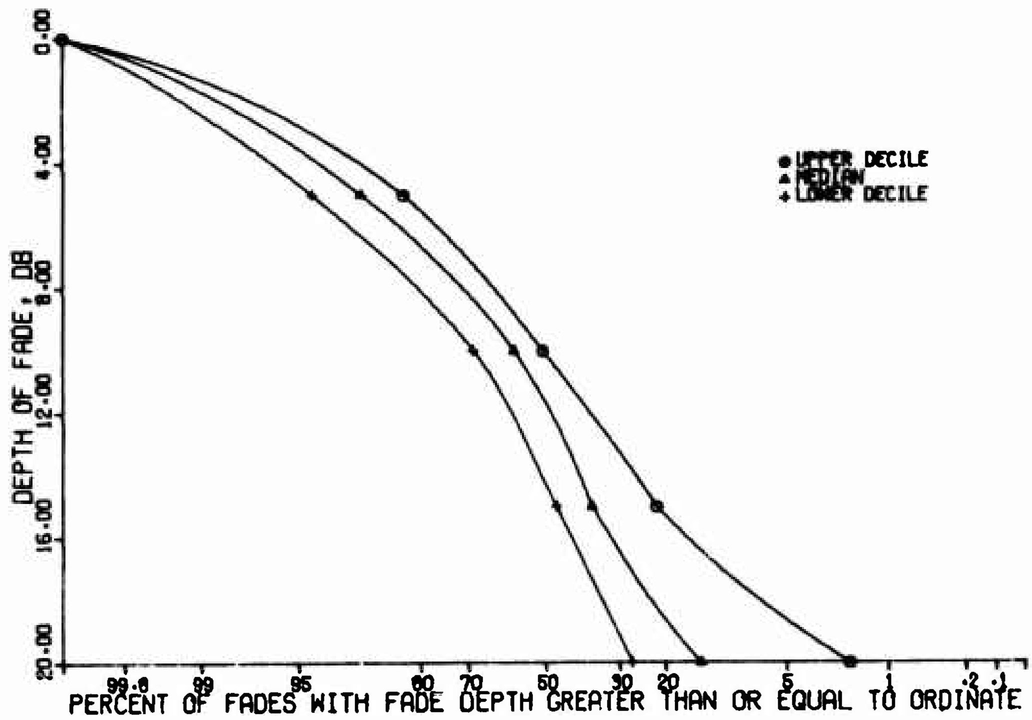


DISTRIBUTION OF DEPTH OF FADES

ONTARIO CENTER, OCTOBER, C-BAND

ALL, 123 TESTS

Figure 234.

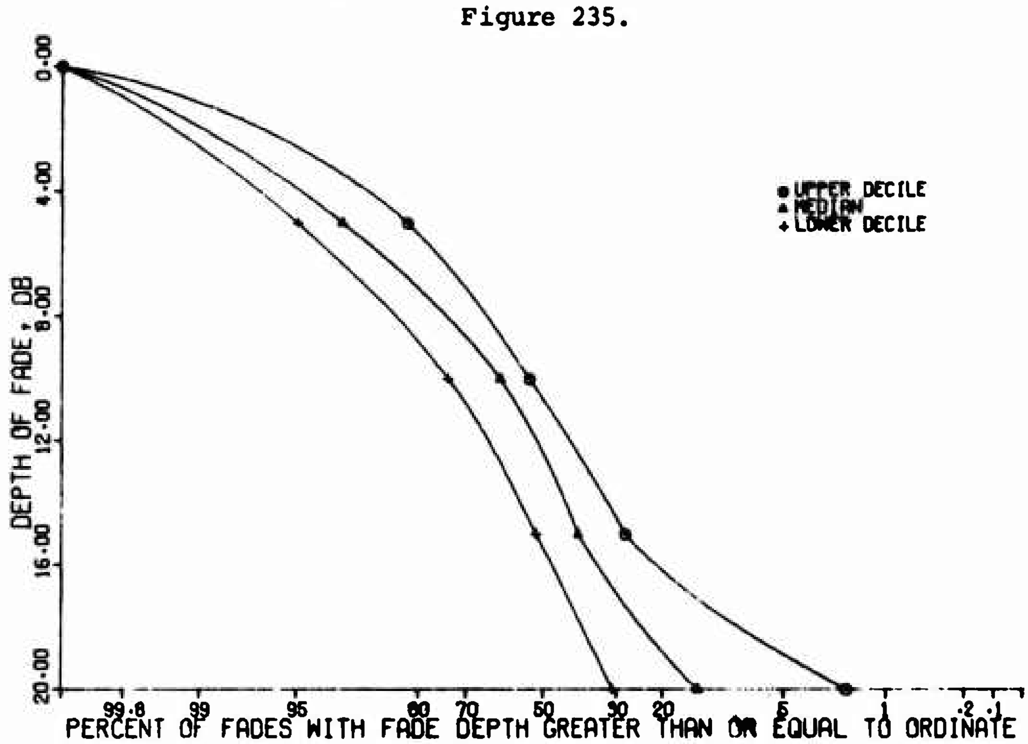


DISTRIBUTION OF DEPTH OF FADES

WHITFORD FIELD, NOVEMBER, X-BAND

ALL, 61 TESTS

Figure 235.

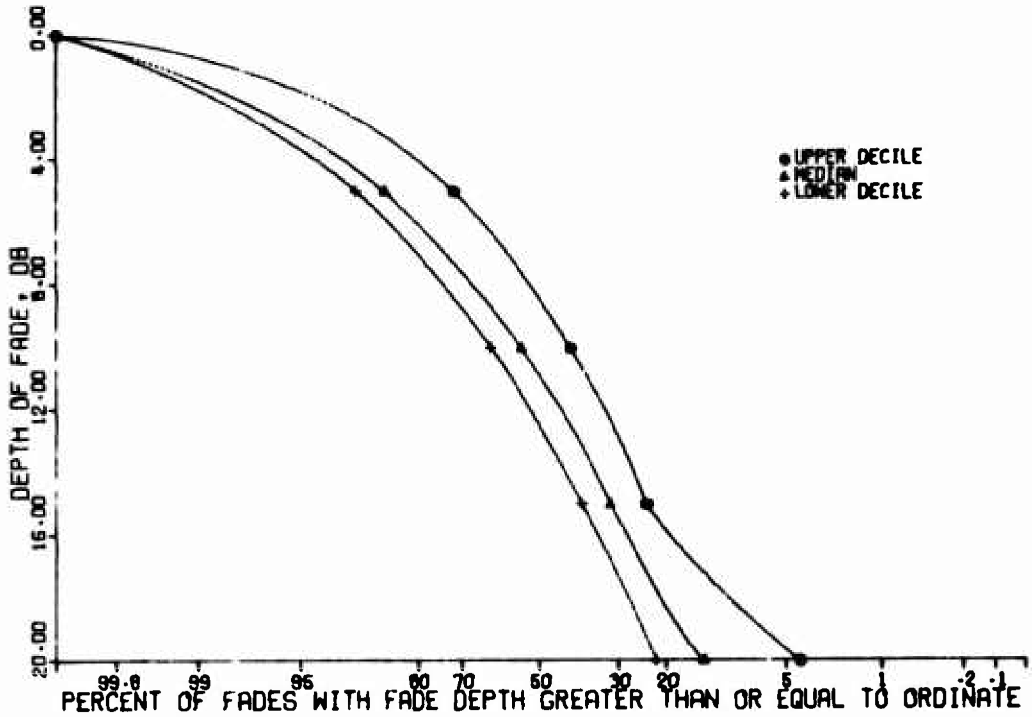


DISTRIBUTION OF DEPTH OF FADES

WHITFORD FIELD, NOVEMBER, C-BAND

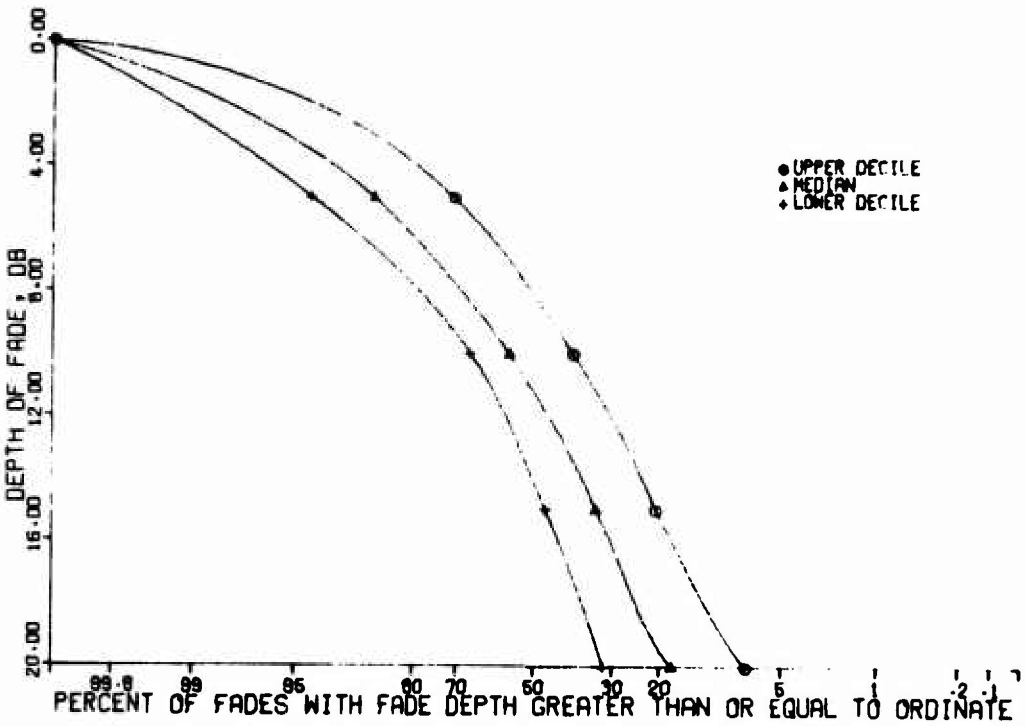
ALL, 41 TESTS

Figure 236.



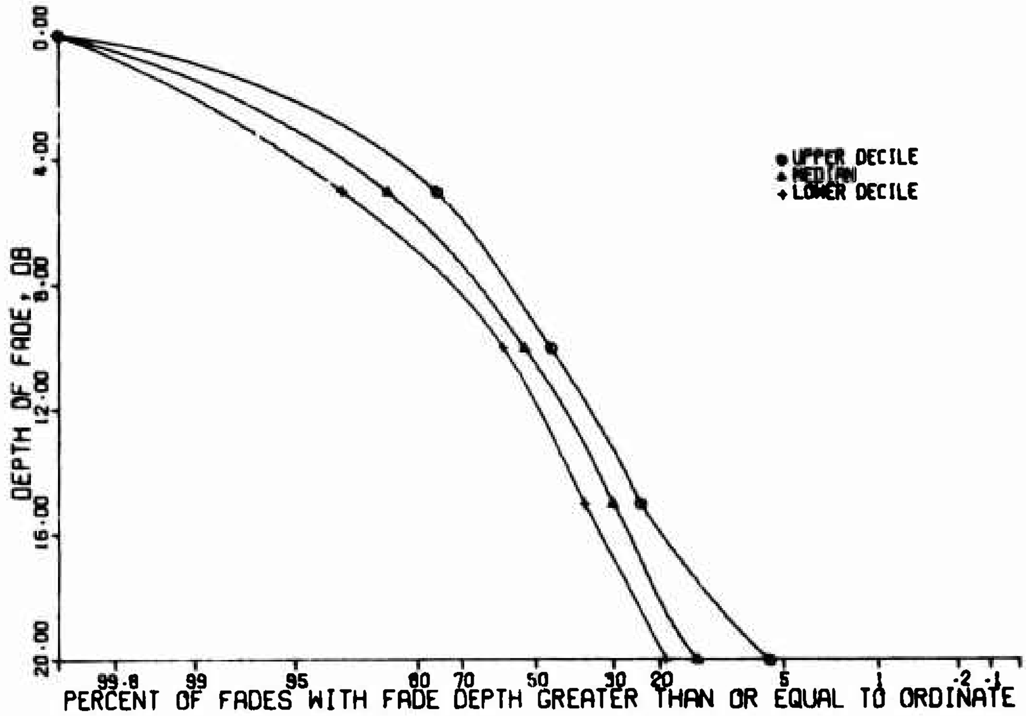
DISTRIBUTION OF DEPTH OF FADES
POINT PETRE, WINTER, X-BAND
ALL, 79 TESTS

Figure 237.



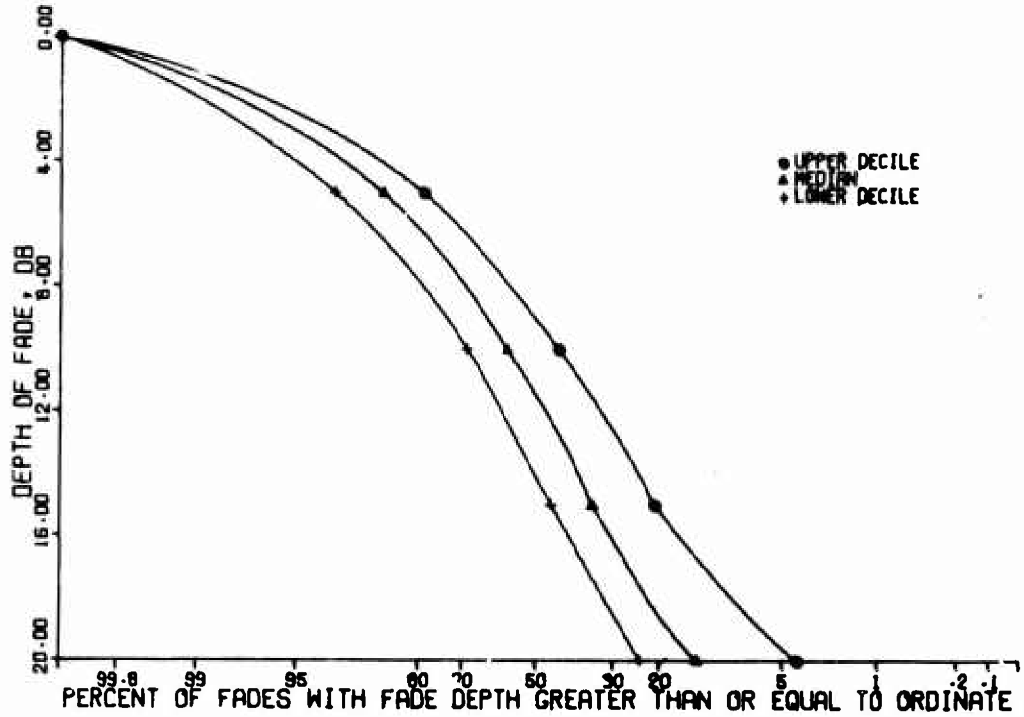
DISTRIBUTION OF DEPTH OF FADES
POINT PETRE, WINTER, C-BAND
ALL, 100 TESTS

Figure 238.



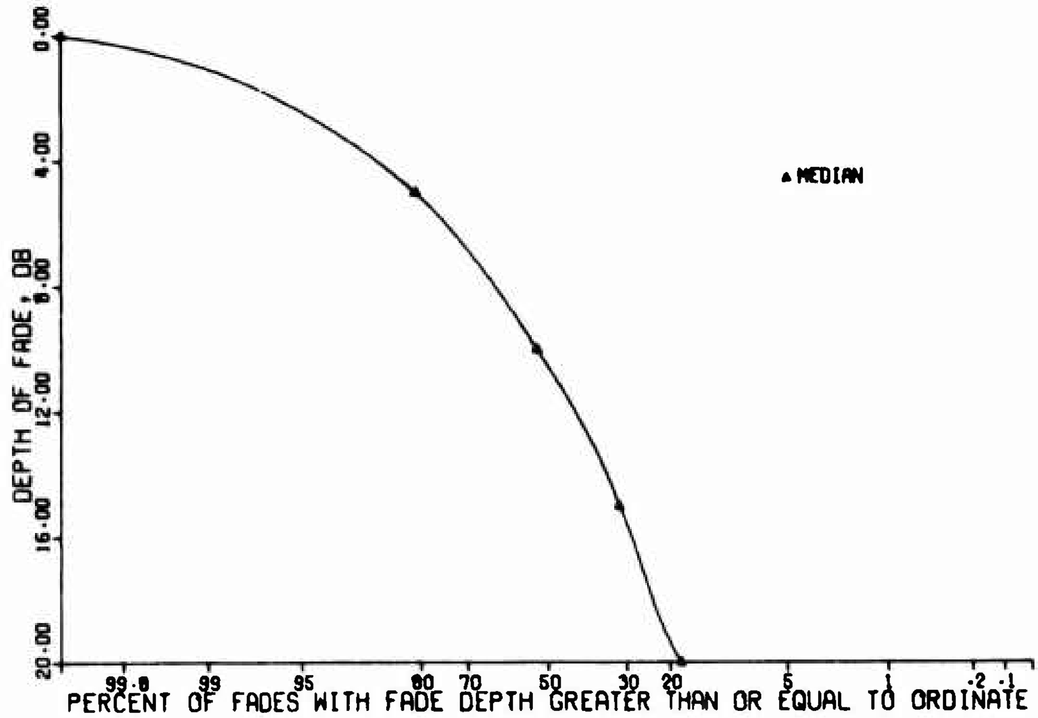
DISTRIBUTION OF DEPTH OF FADES
ONTARIO CENTER, WINTER, X-BAND
ALL, 70 TESTS

Figure 239.



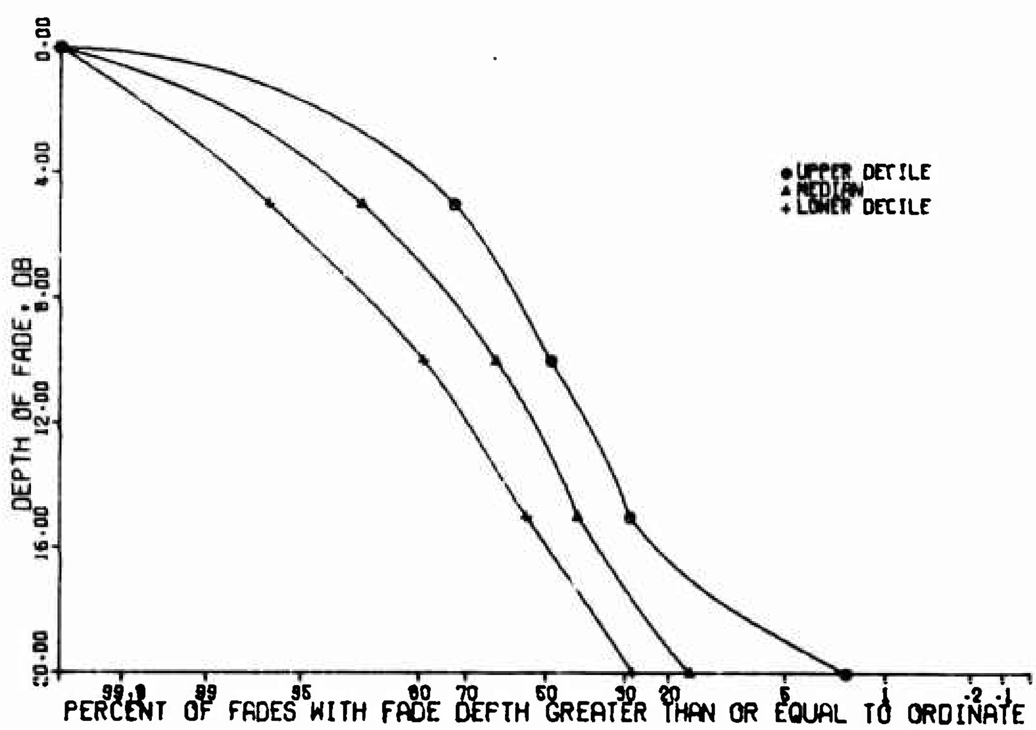
DISTRIBUTION OF DEPTH OF FADES
ONTARIO CENTER, WINTER, C-BAND
ALL, 57 TESTS

Figure 240.



DISTRIBUTION OF DEPTH OF FADES
PORT BYRON, FEBRUARY, X-BAND
ALL, 8 TESTS

Figure 241.



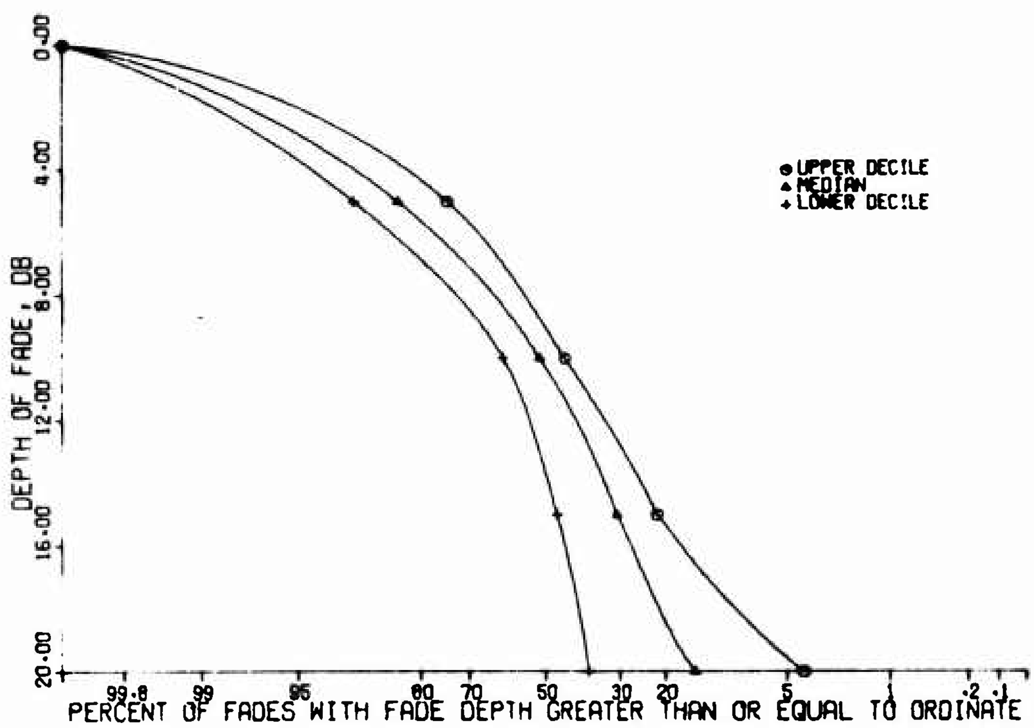
DISTRIBUTION OF DEPTH OF FADES
PORT BYRON, FEBRUARY, C-BAND
ALL, 49 TESTS

Figure 242.

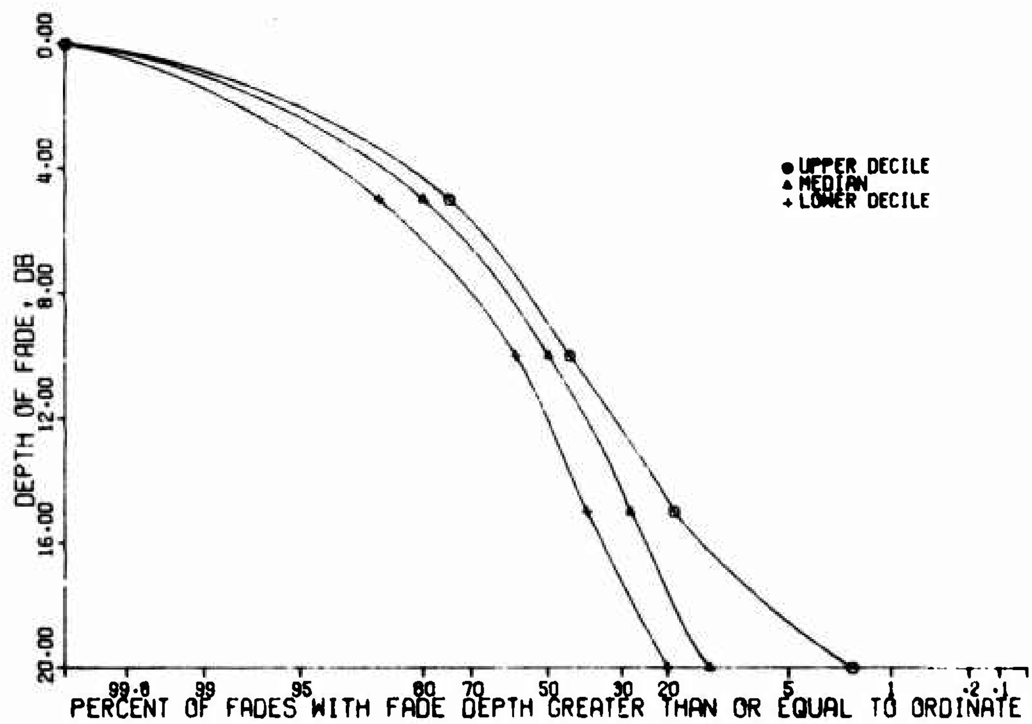
2. Depth of Fade Distributions-Temperature Effects

In a format similar to the preceding subsection, Figures 243 through 246 show the observed depth of fade distributions but subdivided into two Fahrenheit temperature ranges. These temperature ranges are given on the figures and were chosen so that the crossover point is approximately the average temperature for the time and location of the measurements.

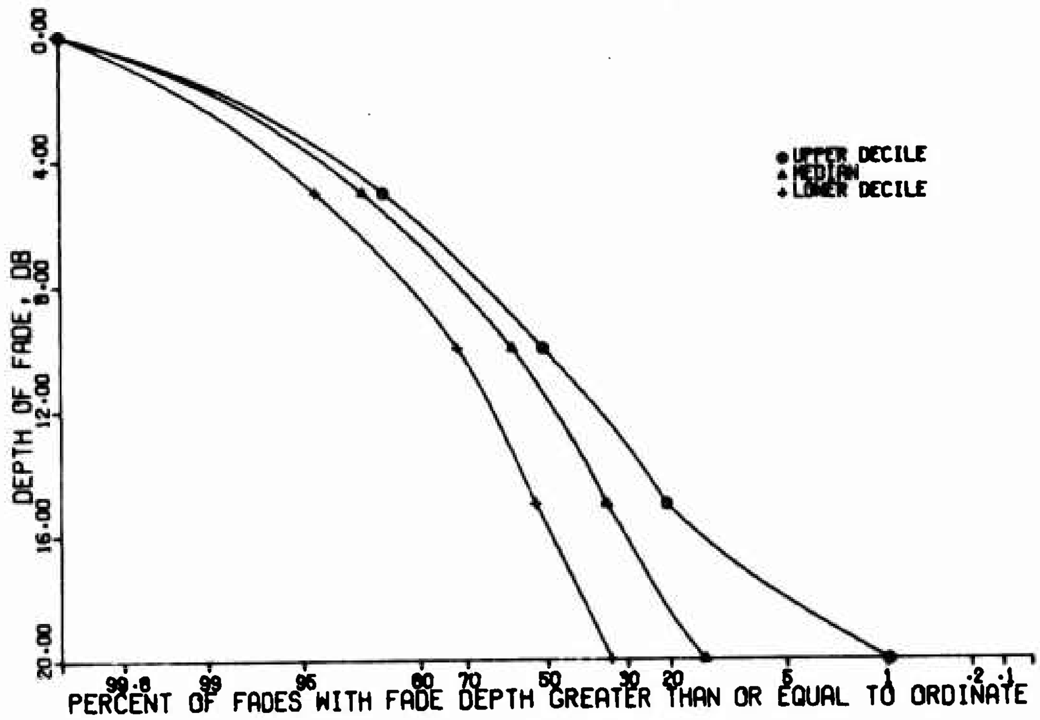
The figures shown are representative and indicate no temperature effect on the fade depths.



DISTRIBUTION OF DEPTH OF FADES
POINT PETRE, SEPTEMBER, C-BAND
TEMPERATURE OVER 57 DEGREES F., 23 TESTS
Figure 243.

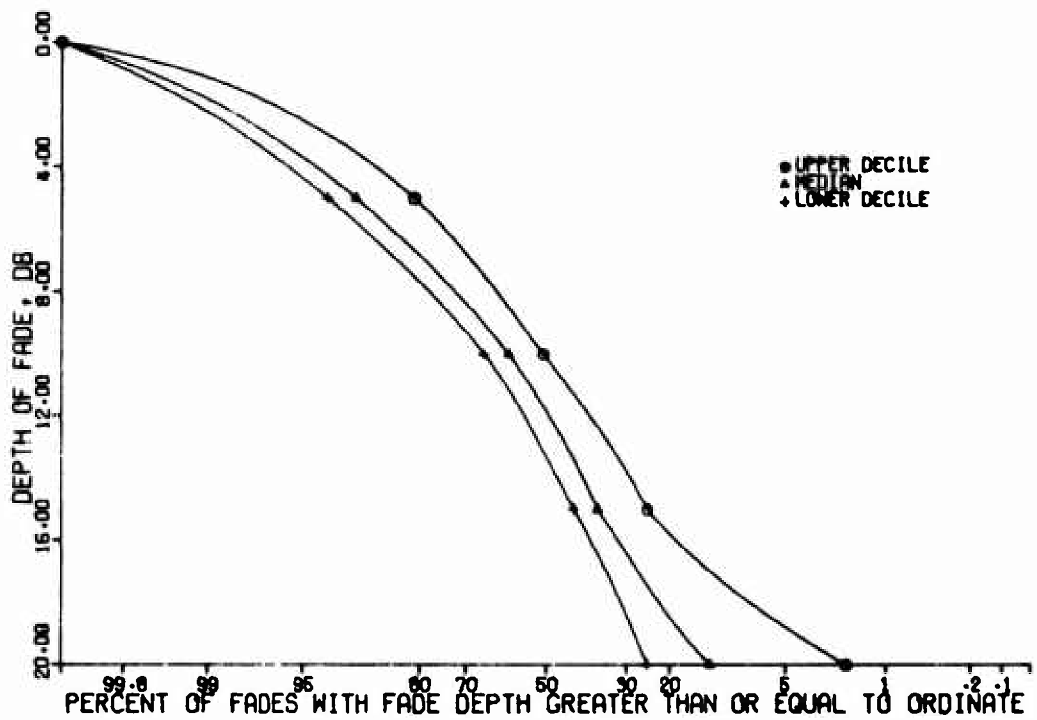


DISTRIBUTION OF DEPTH OF FADES
POINT PETRE, SEPTEMBER, C-BAND
TEMPERATURE NOT OVER 57 DEGREES F., 34 TESTS
Figure 244.



DISTRIBUTION OF DEPTH OF FADES
WHITFORD FIELD, NOVEMBER, X-BAND
TEMPERATURE OVER 49 DEGREES F., 29 TESTS

Figure 245.



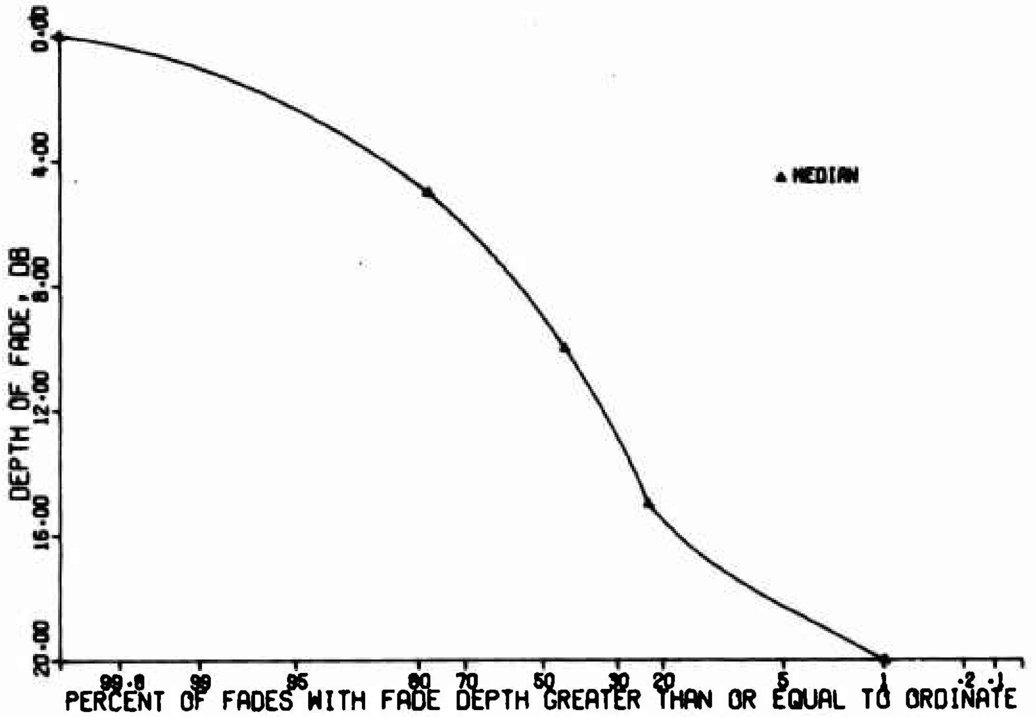
DISTRIBUTION OF DEPTH OF FADES
WHITFORD FIELD, NOVEMBER, X-BAND
TEMPERATURE NOT OVER 49 DEGREES F., 32 TESTS

Figure 246.

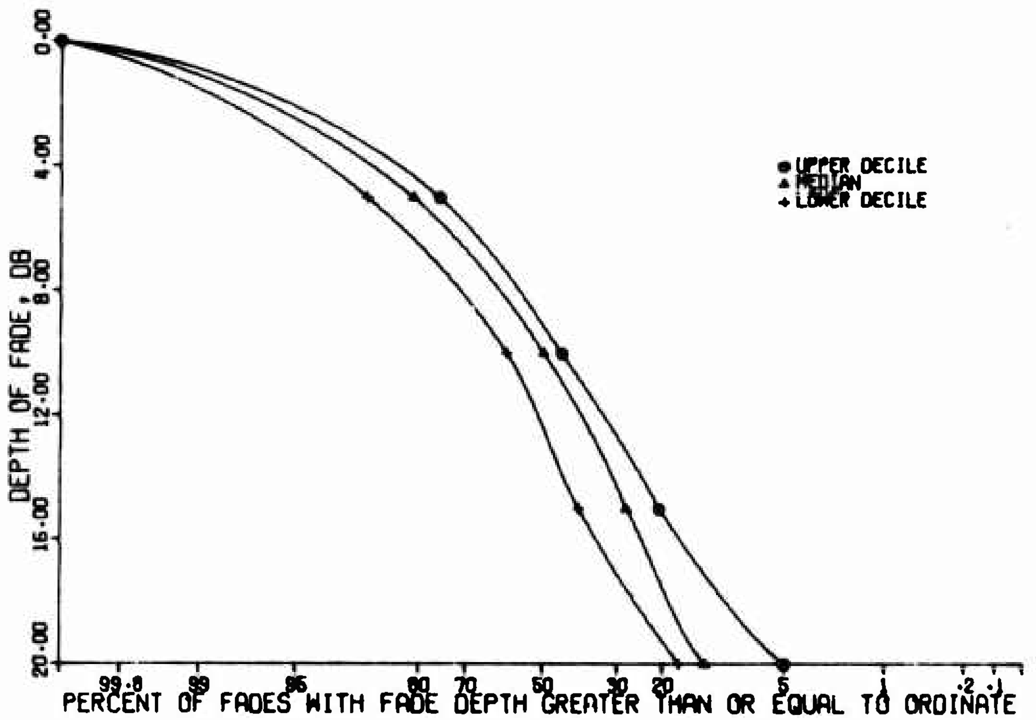
3. Depth of Fade Distributions - Diurnal Effects

In a format similar to that of subsection VI-C-1, Figures 247 through 253 give the observed depth of fade distributions but subdivided into data for four 6 hour periods through the day. These are 0001-0600, 0601-1200, 1201-1800, and 1801-2400 as shown in the figures. The data included in four of the figures contained too few tests to allow a computation of the deciles.

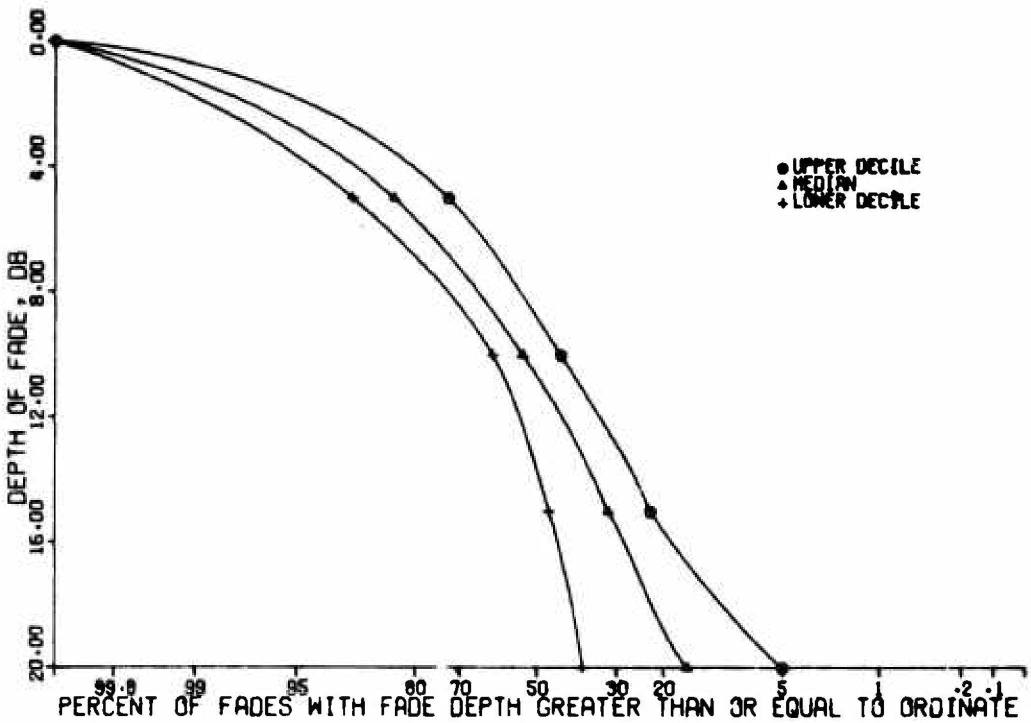
Only a representative sample of all of the available data is presented here since there was no indication of any diurnal effect.



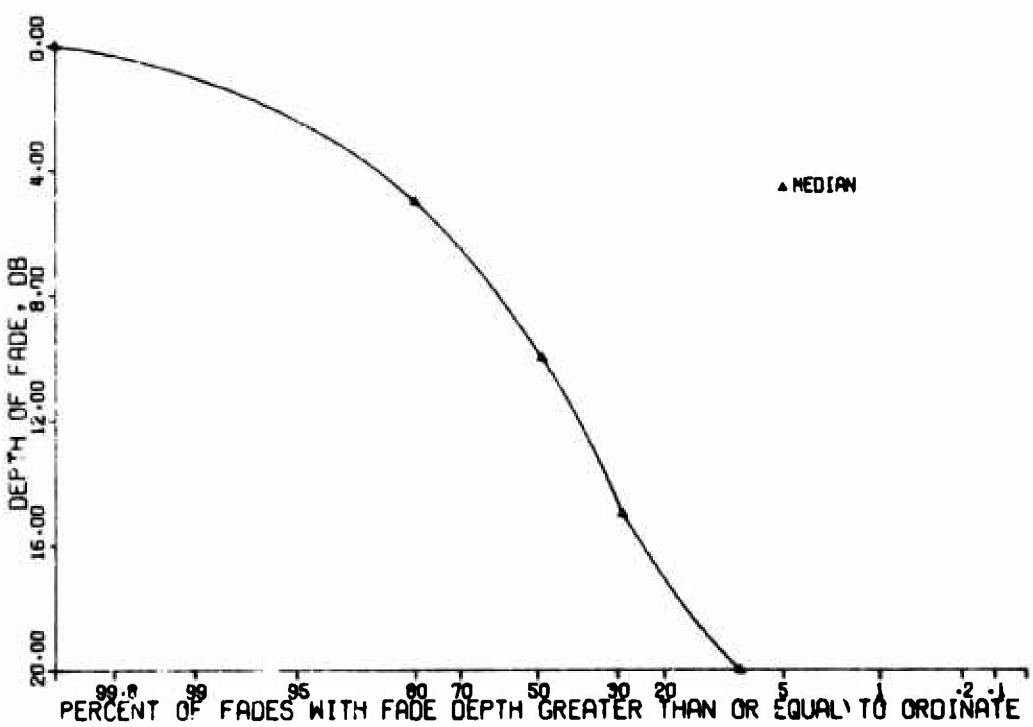
DISTRIBUTION OF DEPTH OF FADES
POINT PETRE, SEPTEMBER, C-BAND
FROM 0001 TO 0600, 3 TESTS
Figure 247.



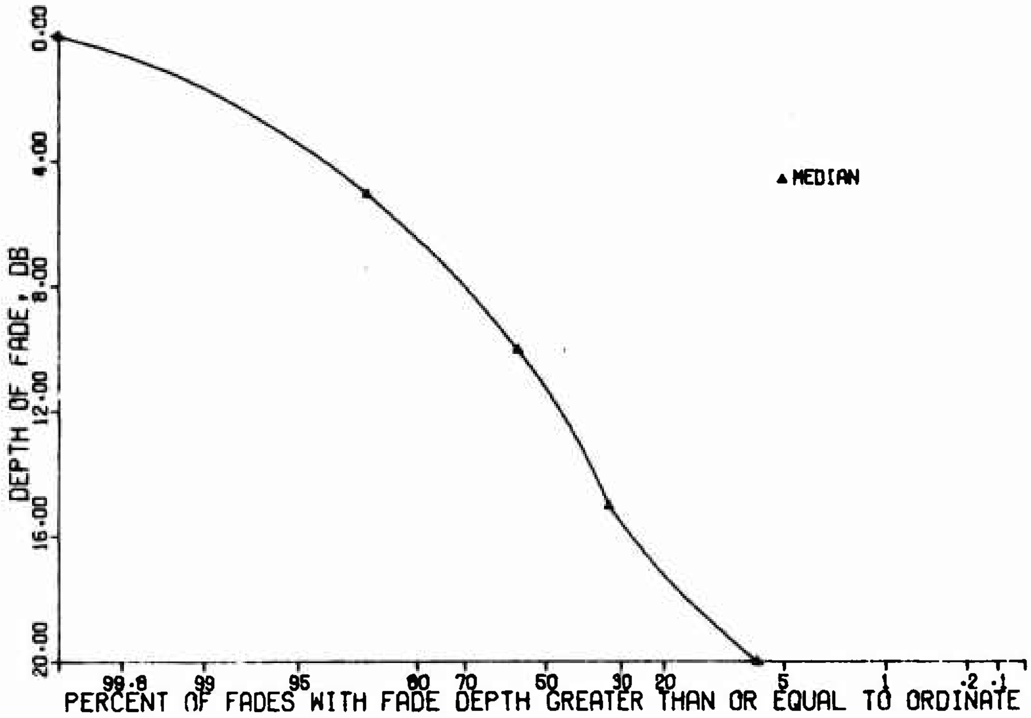
DISTRIBUTION OF DEPTH OF FADES
POINT PETRE, SEPTEMBER, C-BAND
FROM 0601 TO 1200, 24 TESTS
Figure 248.



DISTRIBUTION OF DEPTH OF FADES
POINT PETRE, SEPTEMBER, C-BAND
FROM 1201 TO 1800, 22 TESTS
Figure 249.

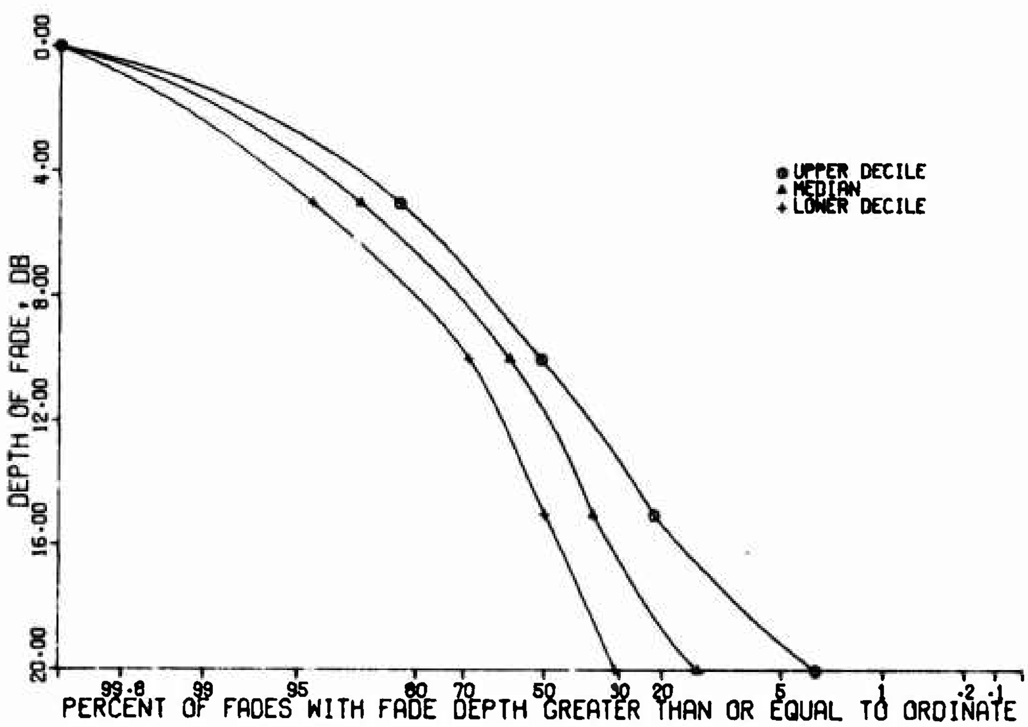


DISTRIBUTION OF DEPTH OF FADES
POINT PETRE, SEPTEMBER, C-BAND
FROM 1801 TO 2400, 8 TESTS
Figure 250.



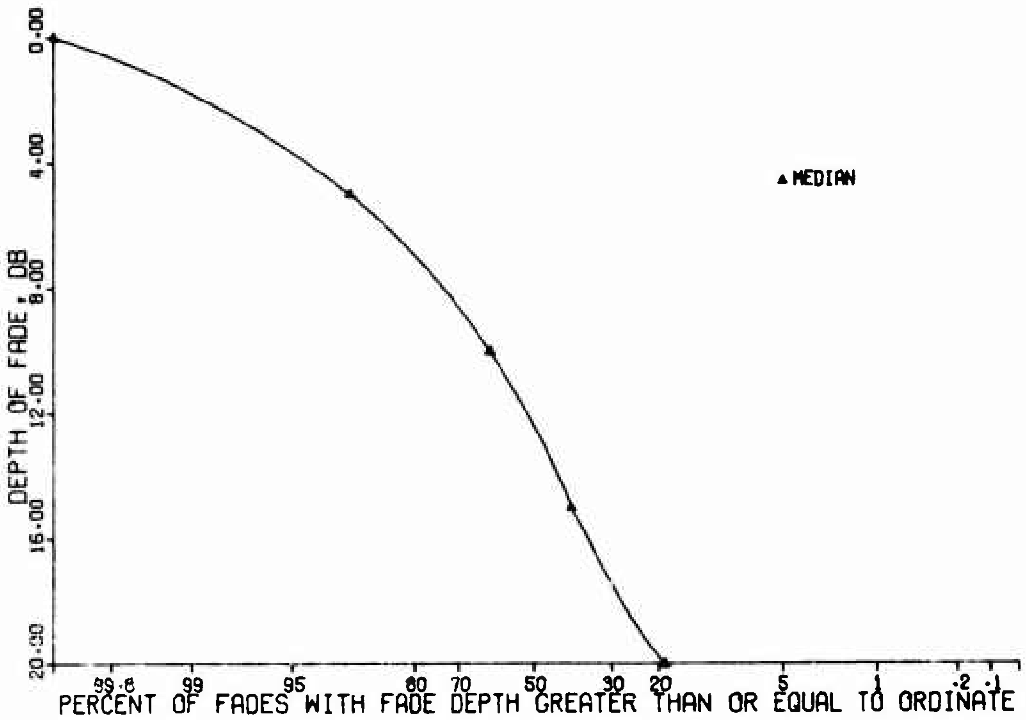
DISTRIBUTION OF DEPTH OF FADES
WHITFORD FIELD, NOVEMBER, X-BAND
FROM 0601 TO 1200, 9 TESTS

Figure 251.



DISTRIBUTION OF DEPTH OF FADES
WHITFORD FIELD, NOVEMBER, X-BAND
FROM 1201 TO 1800, 46 TESTS

Figure 252.



DISTRIBUTION OF DEPTH OF FADES
WHITFORD FIELD, NOVEMBER, X-BAND
FROM 1801 TO 2400, 6 TESTS

Figure 253.

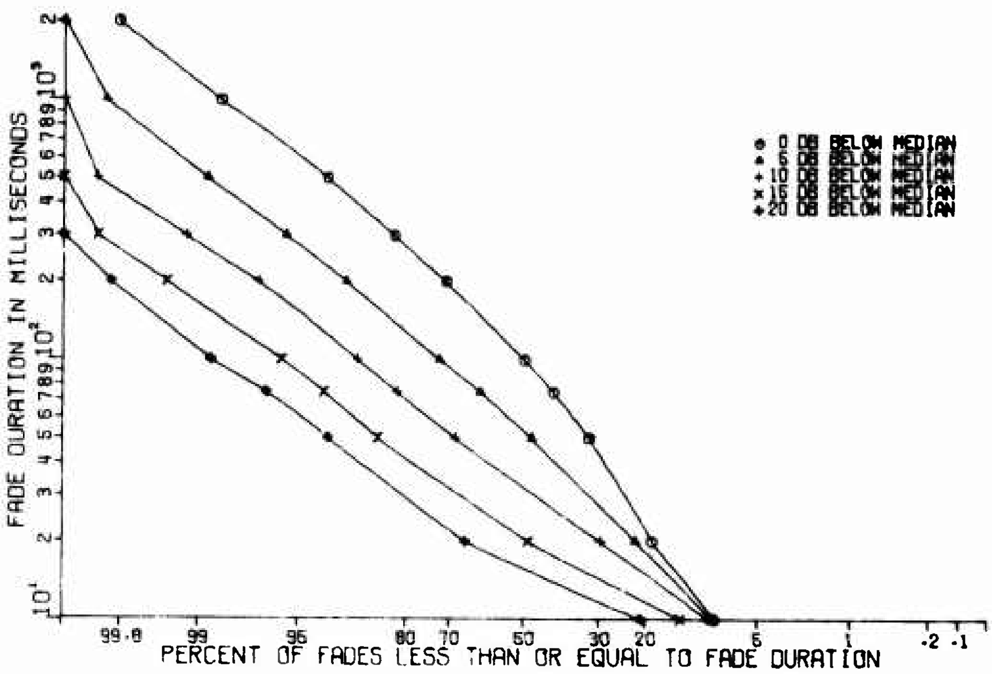
D. FADE DURATION DISTRIBUTIONS

Fade duration distributions are shown in Figures 254 through 286 for fade levels of 0, 5, 10, 15, and 20 dB below the median. On all of these plots cumulative percentage is plotted on a normal probability scale. Only typical examples of temperature and diurnal effects on these kinds of data are shown. For those plots which are omitted from this report, either the spread of values corresponds closely to the "All" plots which are included or the range of values is similar to the temperature and diurnal effect plots which are included. The comparative spread of values is shown on the summary bar graphs at the end of this section.

1. Overall Fade Duration Distributions

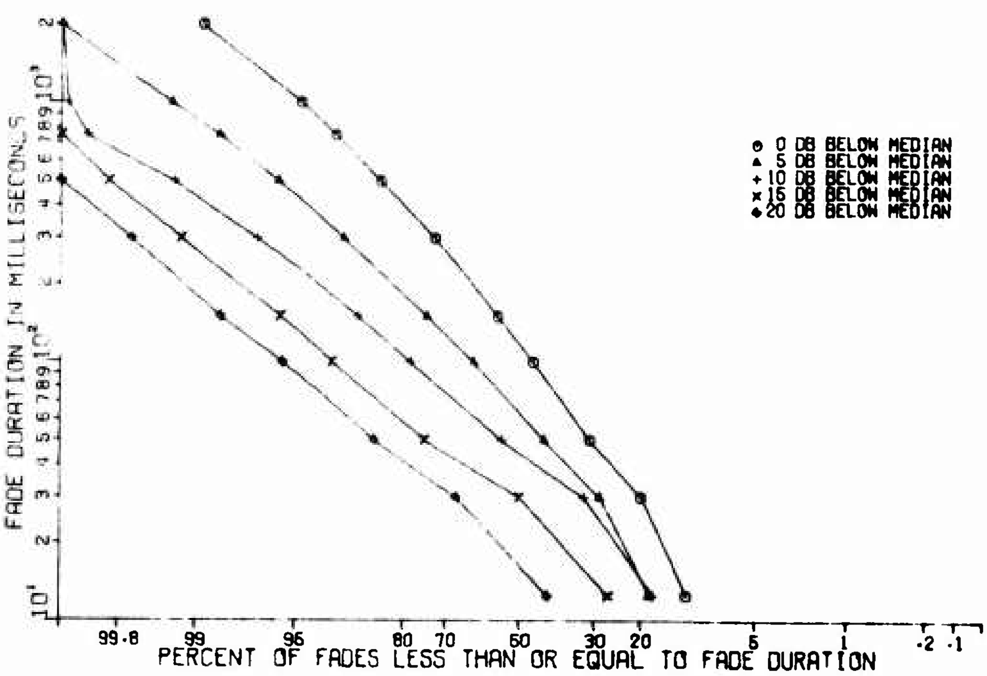
Figures 254 through 269 give the overall fade duration distributions over the four paths. The plots are arranged in the order of season or month, then by site, and finally by frequency band. The number of tests for each distribution is shown on the figures. The fade duration distribution is given for the median and four other levels.

For all paths the fade duration distributions are similar and no seasonal dependence is evident. As might be expected from the fade rate distributions, there is a difference between the X- and C-band durations. For the fade duration at the median level the average value at X-band is approximately 80 milliseconds while at C-band the corresponding figure is 110 milliseconds.



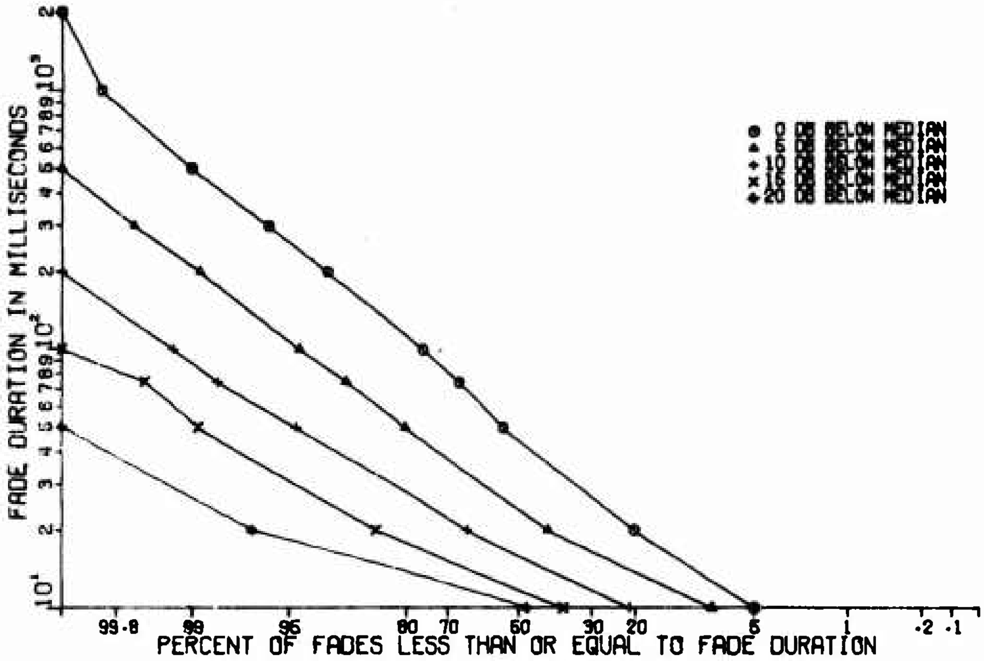
DISTRIBUTION OF FADE DURATION
ONTARIO CENTER, SUMMER, X-BAND
ALL, 88 TESTS

Figure 254.



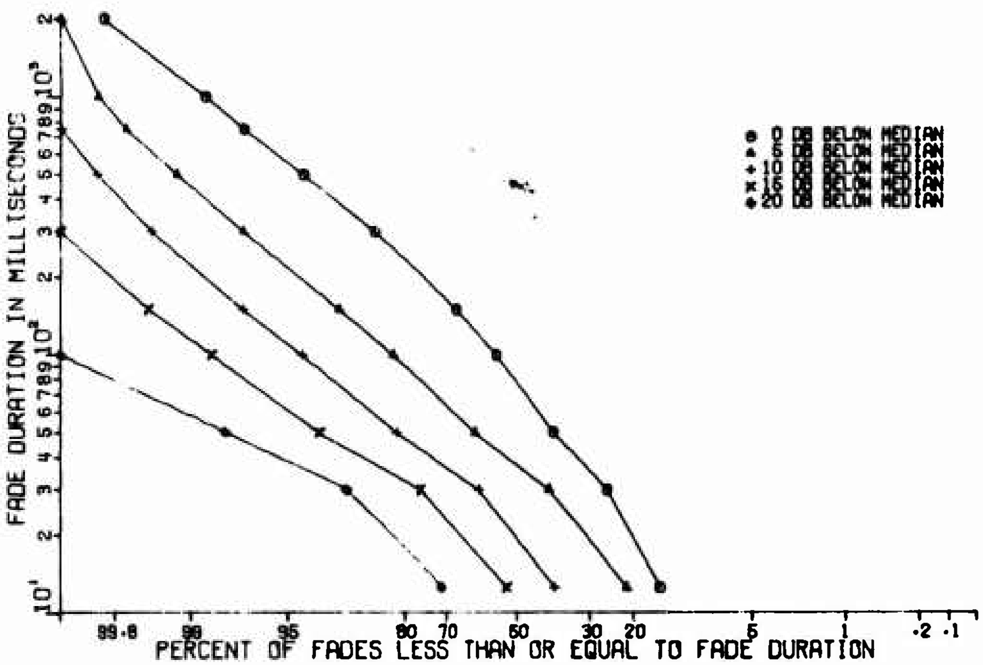
DISTRIBUTION OF FADE DURATION
ONTARIO CENTER, SUMMER, C-BAND
ALL, 46 TESTS

Figure 255.



DISTRIBUTION OF FADE DURATION
WHITFORD FIELD, SUMMER, X-BAND
ALL, 9 TESTS

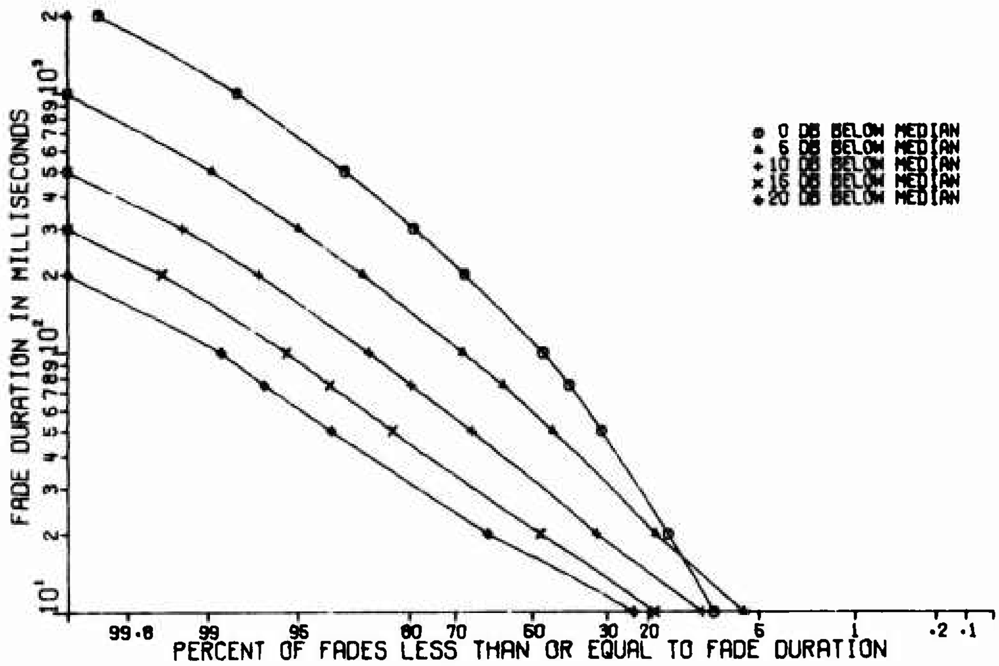
Figure 256.



DISTRIBUTION OF FADE DURATION
WHITFORD FIELD, SUMMER, C-BAND
ALL, 30 TESTS

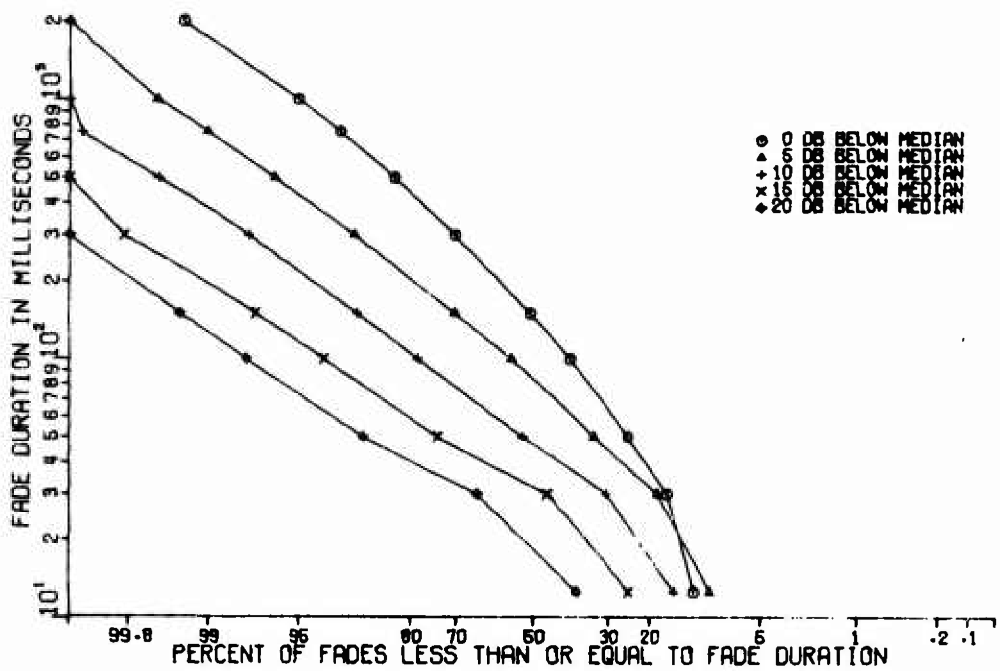
Figure 257.

4



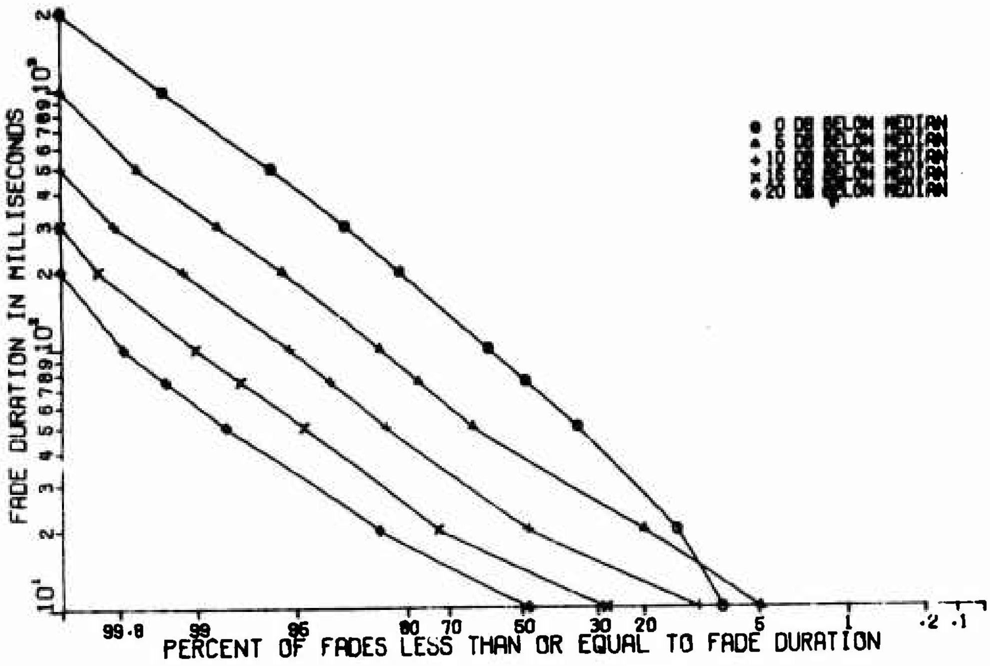
DISTRIBUTION OF FADE DURATION
POINT PETRE, SEPTEMBER, X-BAND
ALL, 62 TESTS

Figure 258.



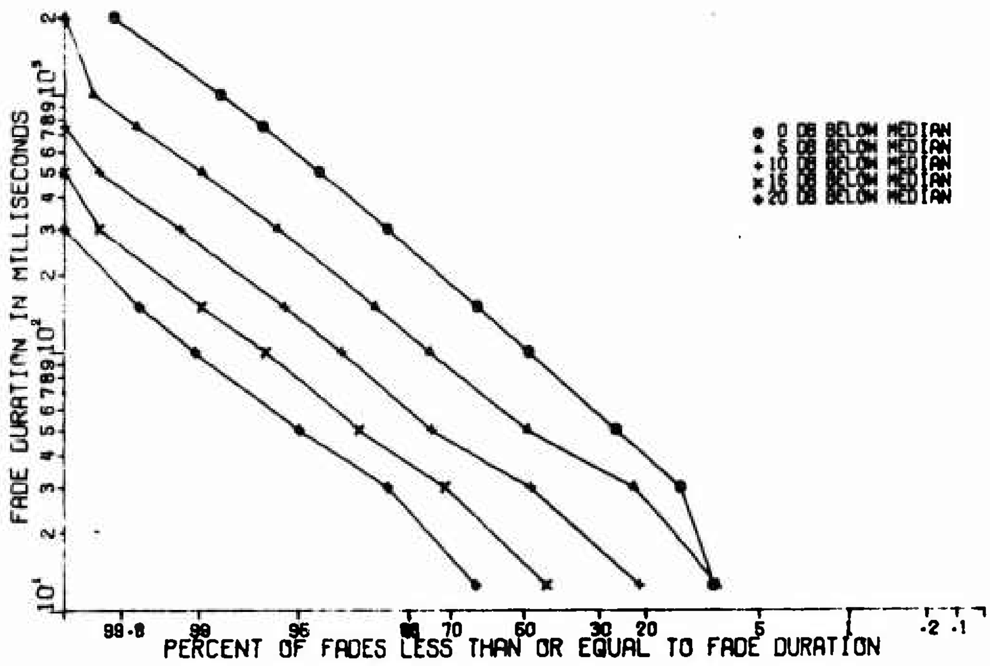
DISTRIBUTION OF FADE DURATION
POINT PETRE, SEPTEMBER, C-BAND
ALL, 73 TESTS

Figure 259.



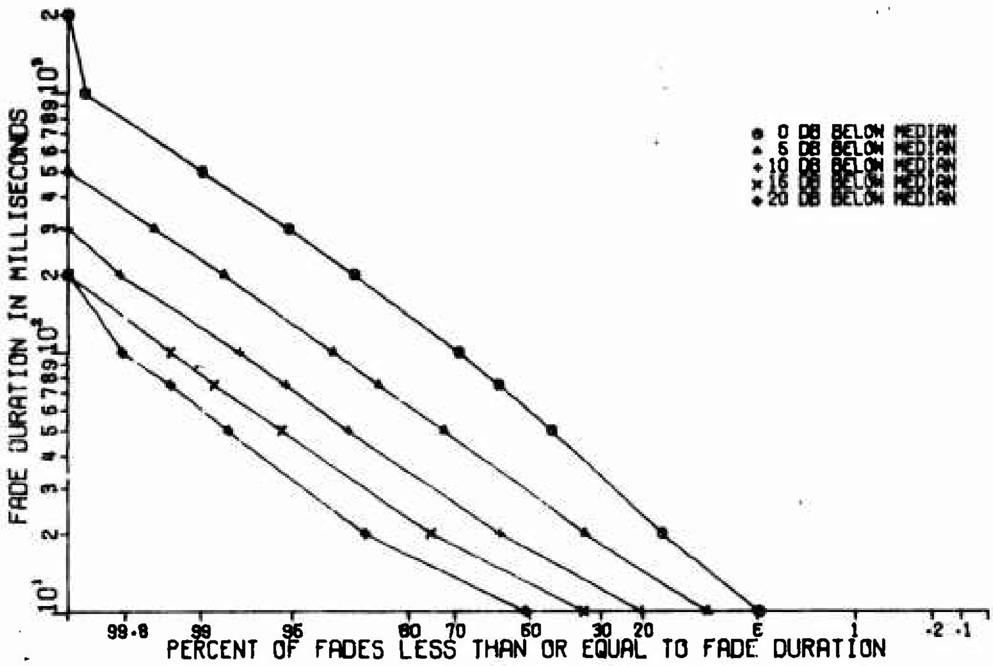
DISTRIBUTION OF FADE DURATION
ONTARIO CENTER, OCTOBER, X-BAND
ALL, 114 TESTS

Figure 260.



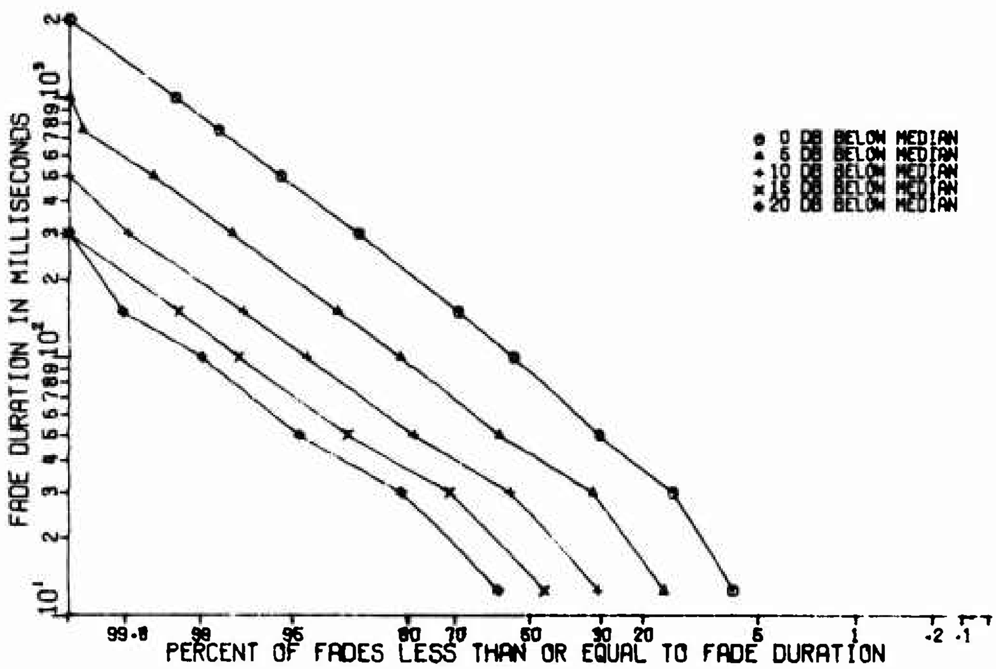
DISTRIBUTION OF FADE DURATION
ONTARIO CENTER, OCTOBER, C-BAND
ALL, 128 TESTS

Figure 261.



DISTRIBUTION OF FADE DURATION
WHITFORD FIELD, NOVEMBER, X-BAND
ALL, 61 TESTS

Figure 262.



DISTRIBUTION OF FADE DURATION
WHITFORD FIELD, NOVEMBER, C-BAND
ALL, 41 TESTS

Figure 263.

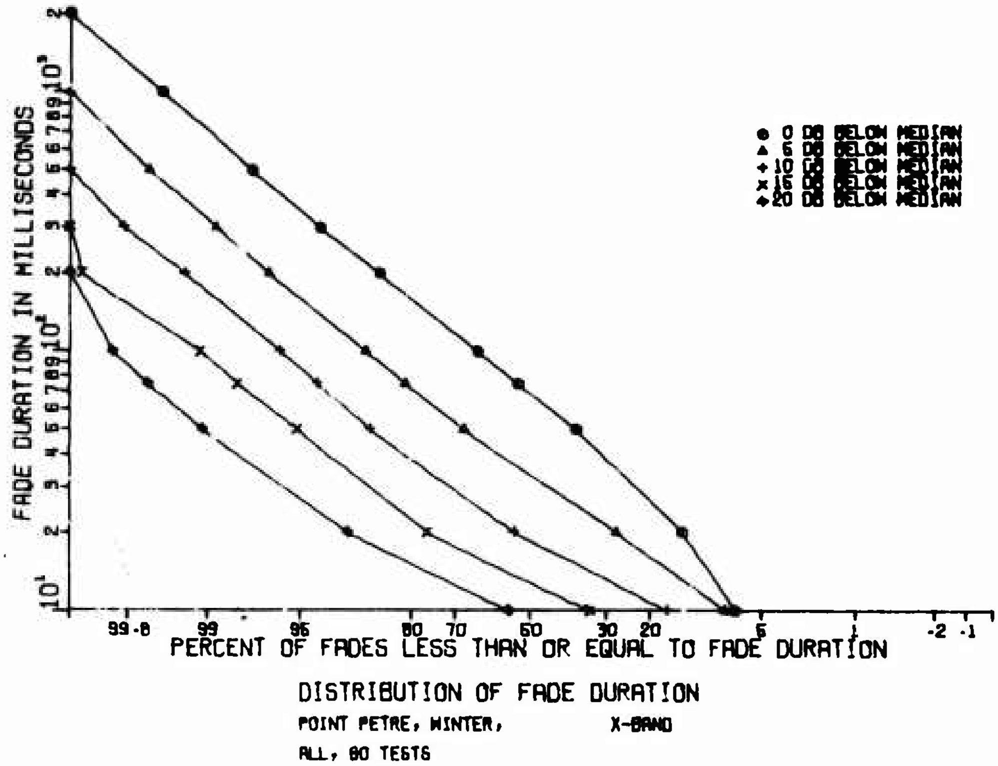


Figure 264.

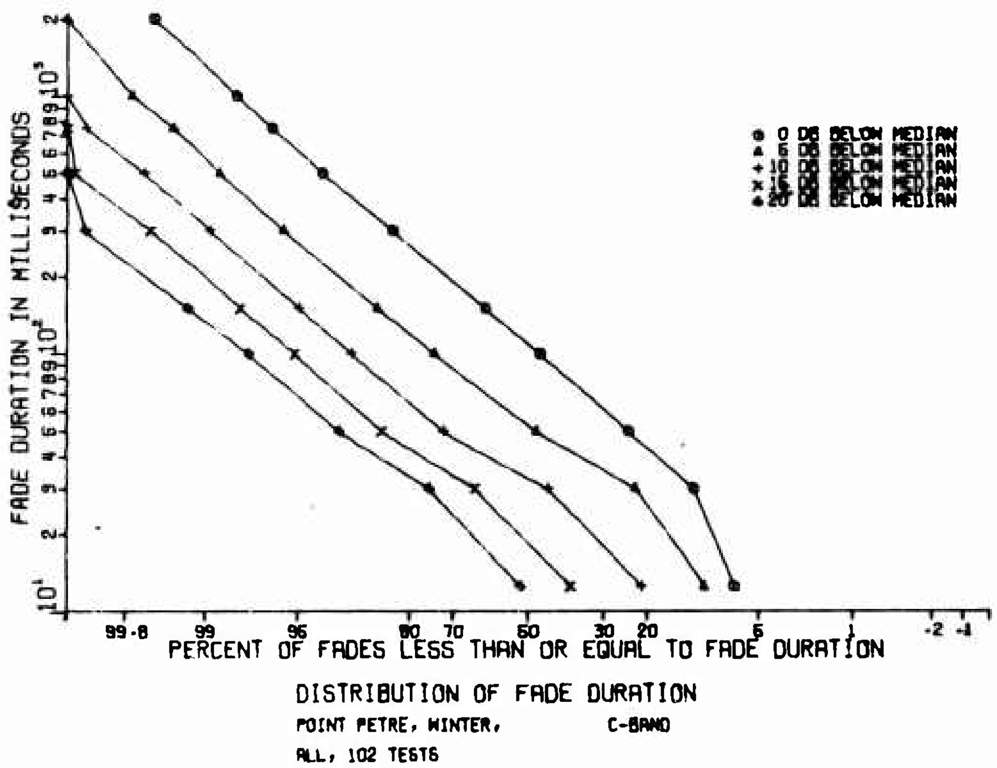
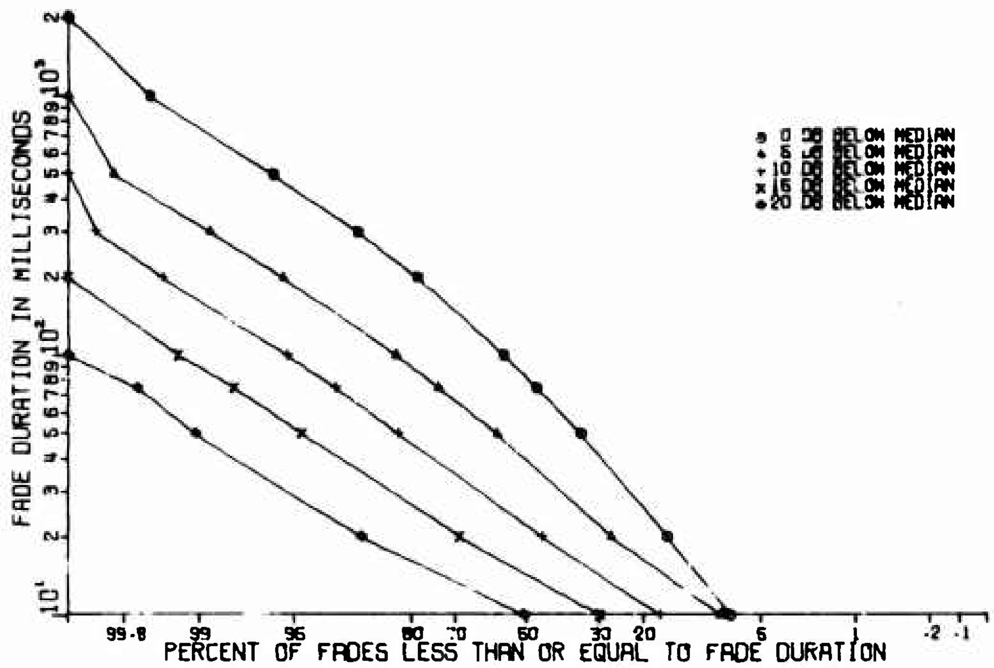
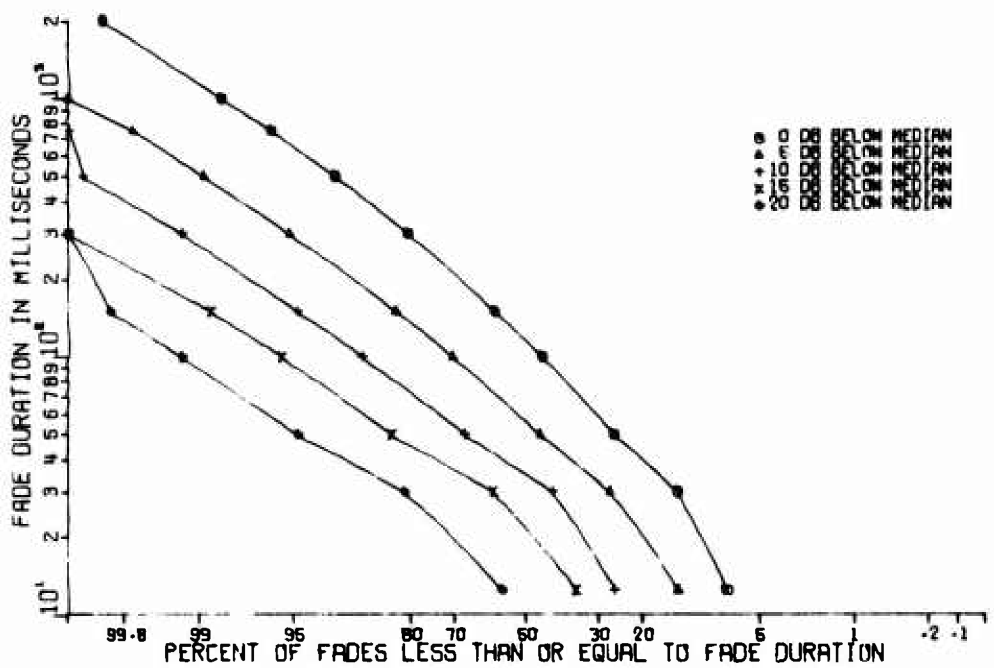


Figure 265.



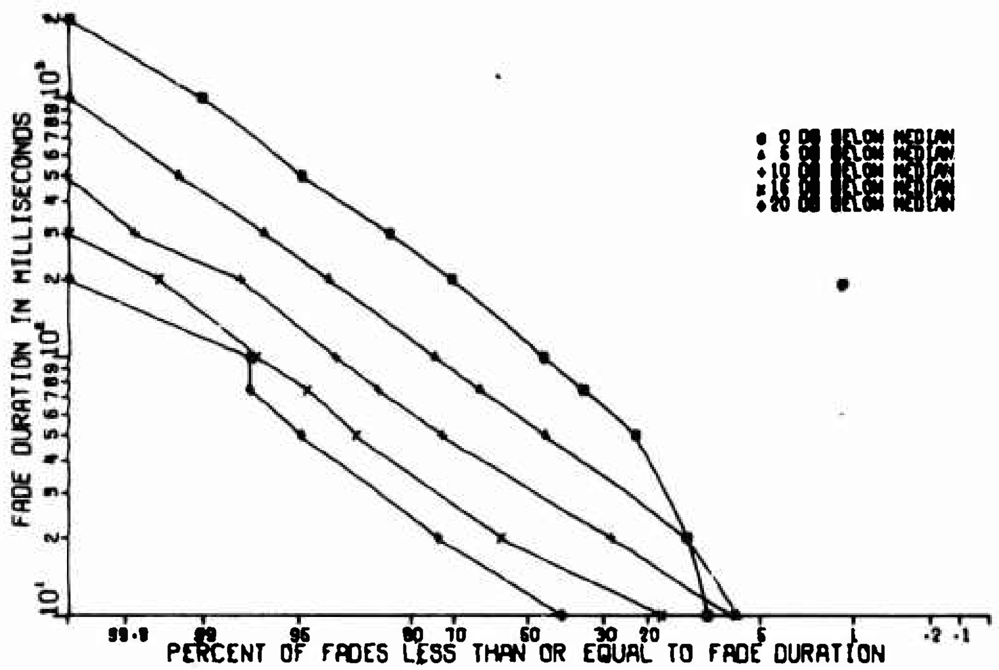
DISTRIBUTION OF FADE DURATION
ONTARIO CENTER, WINTER, X-BAND
ALL, 70 TESTS

Figure 266.



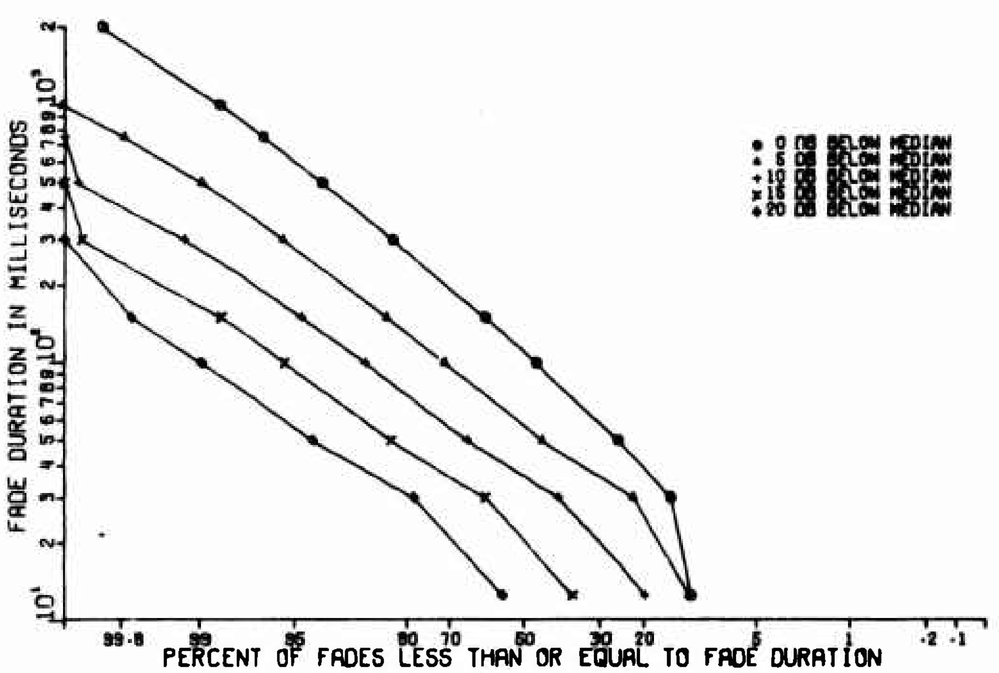
DISTRIBUTION OF FADE DURATION
ONTARIO CENTER, WINTER, C-BAND
ALL, 57 TESTS

Figure 267.



DISTRIBUTION OF FADE DURATION
PORT BYRON, FEBRUARY, X-BAND
ALL, 8 TESTS

Figure 268.



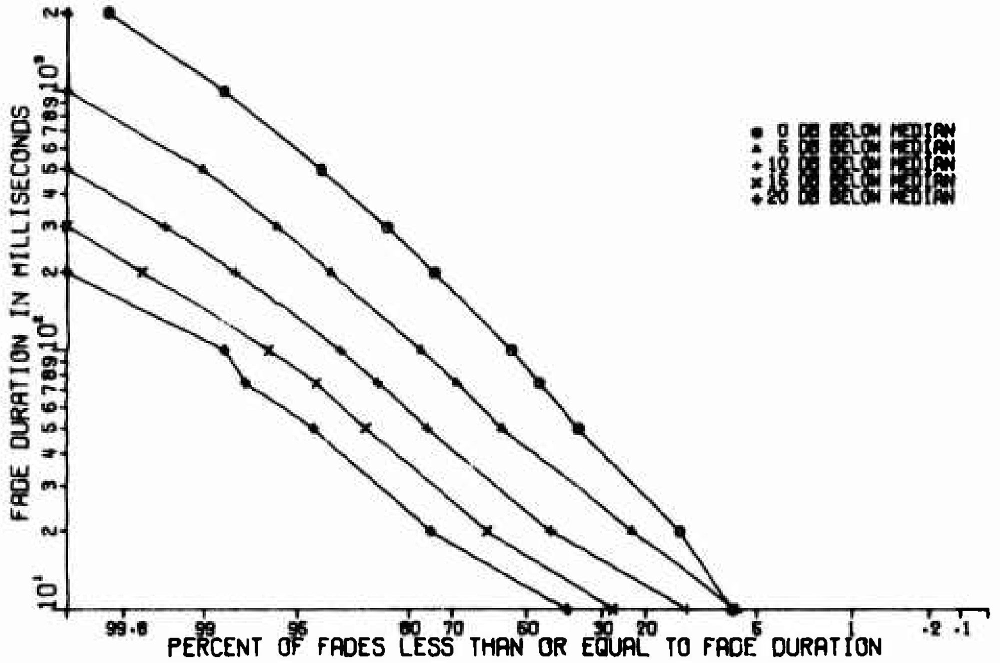
DISTRIBUTION OF FADE DURATION
PORT BYRON, FEBRUARY, C-BAND
ALL, 49 TESTS

Figure 269.

2. Fade Duration Distributions - Temperature Effects

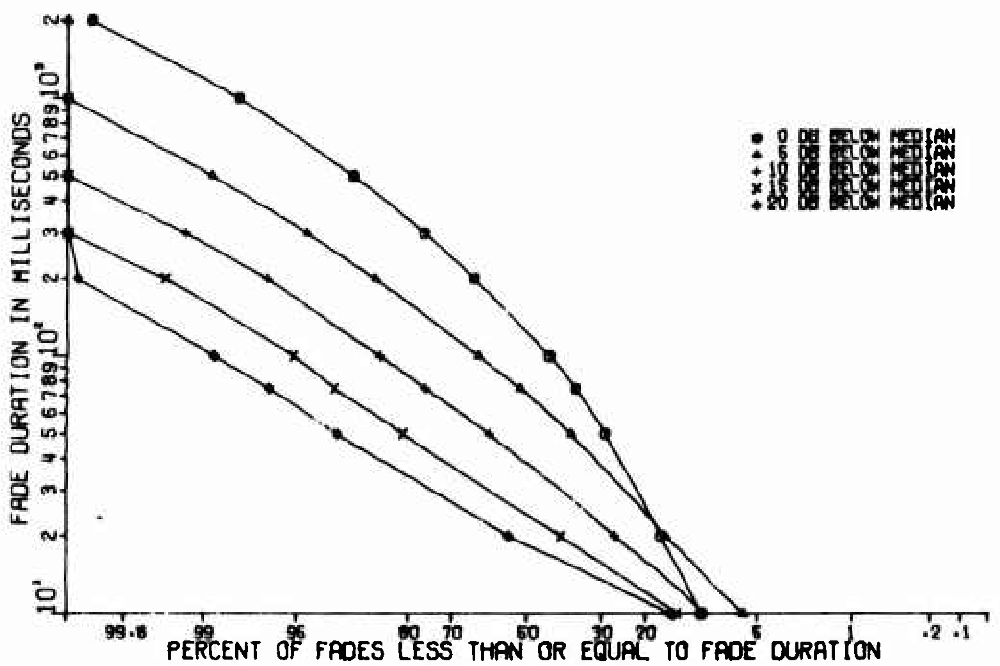
In a format similar to the preceding subsection, Figures 270 through 275 show the observed depth of fade distributions but subdivided into two Fahrenheit temperature ranges. These temperature ranges are given on the figures and were chosen so that the crossover point is approximately the average temperature for the time and location of the measurements.

The figures shown are representative and indicate no temperature effect on fade duration.



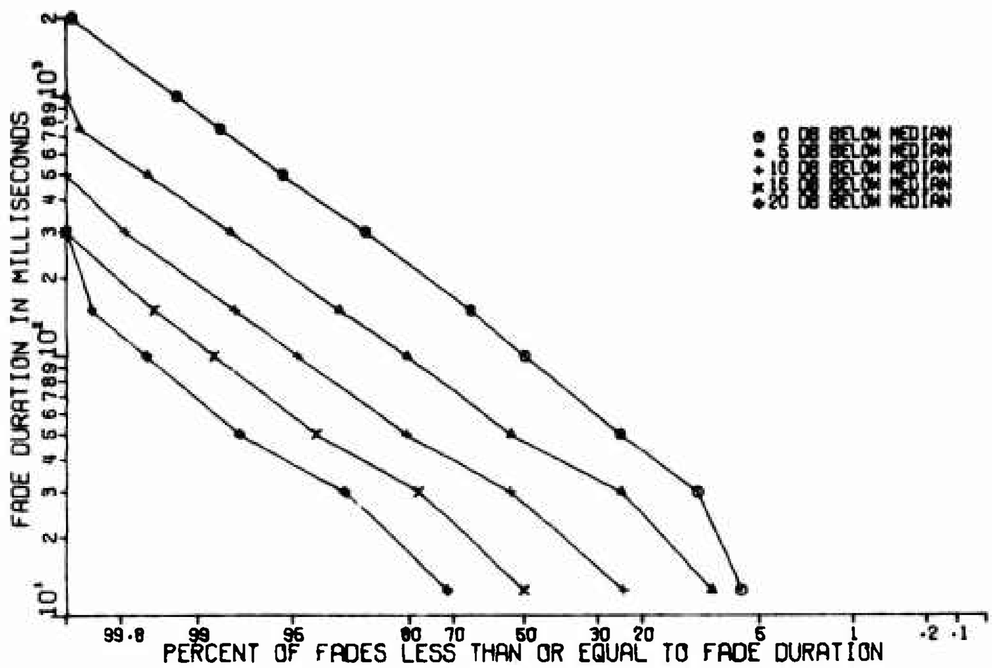
DISTRIBUTION OF FADE DURATION
POINT PETRE, SEPTEMBER, X-BAND
TEMPERATURE OVER 57 DEGREES F., 17 TESTS

Figure 270.



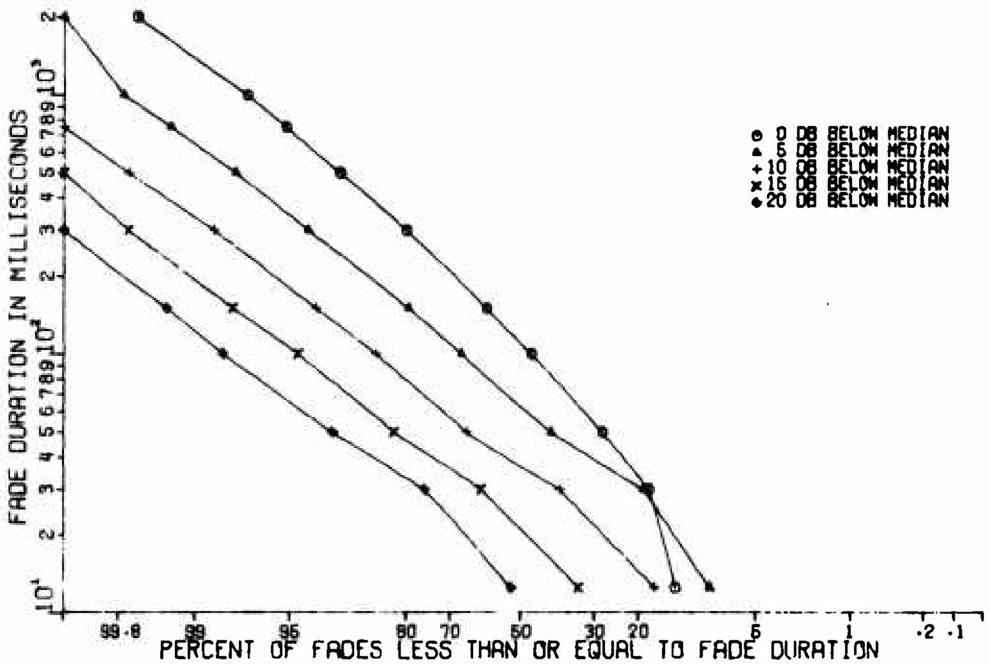
DISTRIBUTION OF FADE DURATION
POINT PETRE, SEPTEMBER, X-BAND
TEMPERATURE NOT OVER 57 DEGREES F., 45 TESTS

Figure 271.



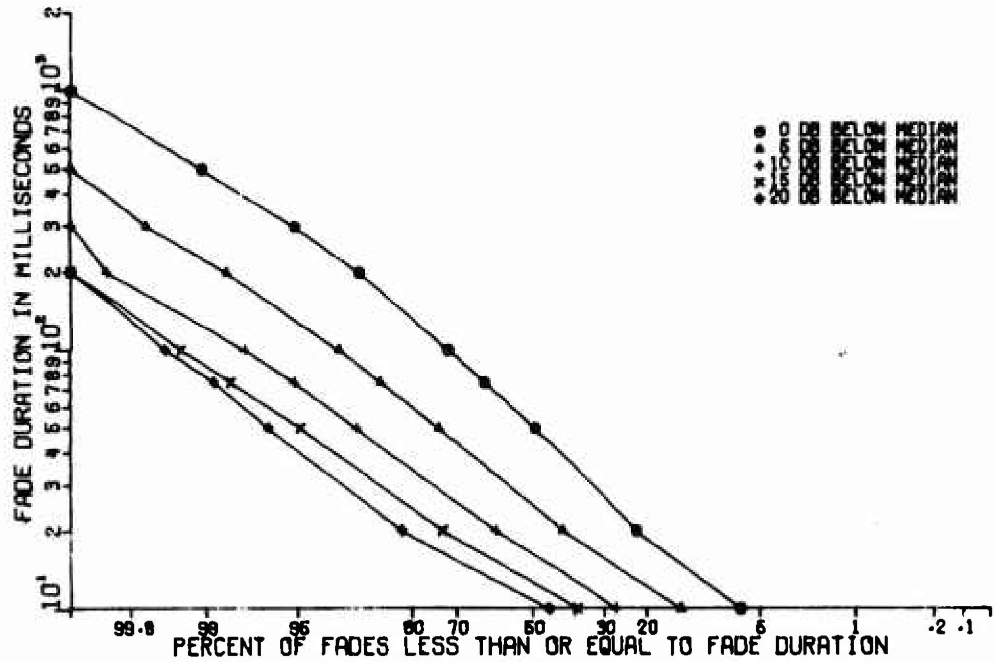
DISTRIBUTION OF FADE DURATION
ONTARIO CENTER, OCTOBER, C-BAND
TEMPERATURE OVER 57 DEGREES F., 62 TESTS

Figure 272.



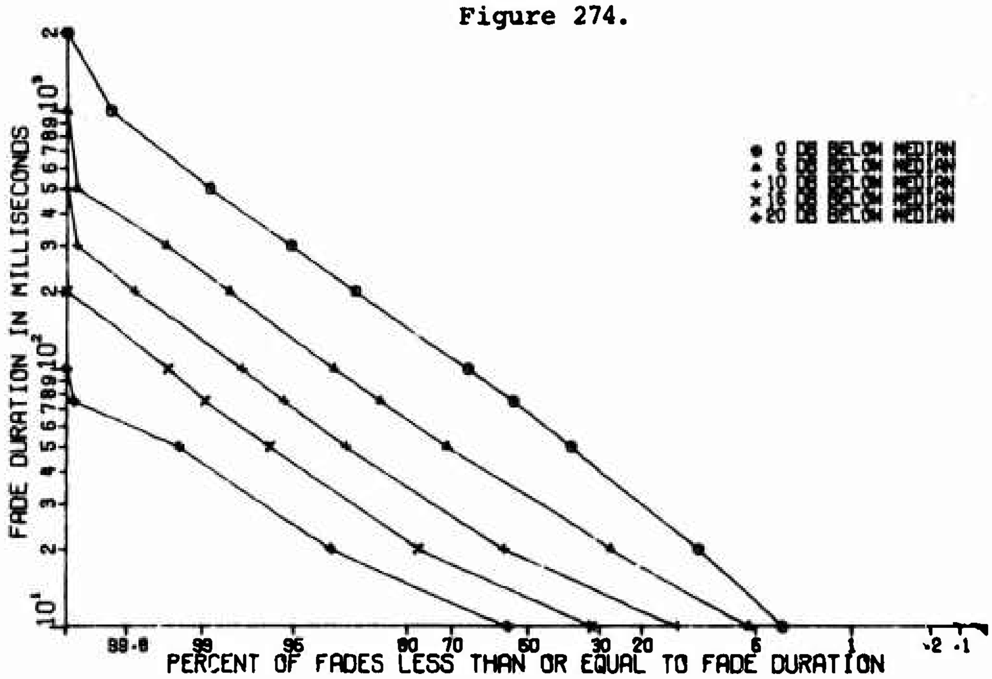
DISTRIBUTION OF FADE DURATION
ONTARIO CENTER, OCTOBER, C-BAND
TEMPERATURE NOT OVER 57 DEGREES F., 64 TESTS

Figure 273.



DISTRIBUTION OF FADE DURATION
WHITFORD FIELD, NOVEMBER, X-BAND
TEMPERATURE OVER 49 DEGREES F., 29 TESTS

Figure 274.



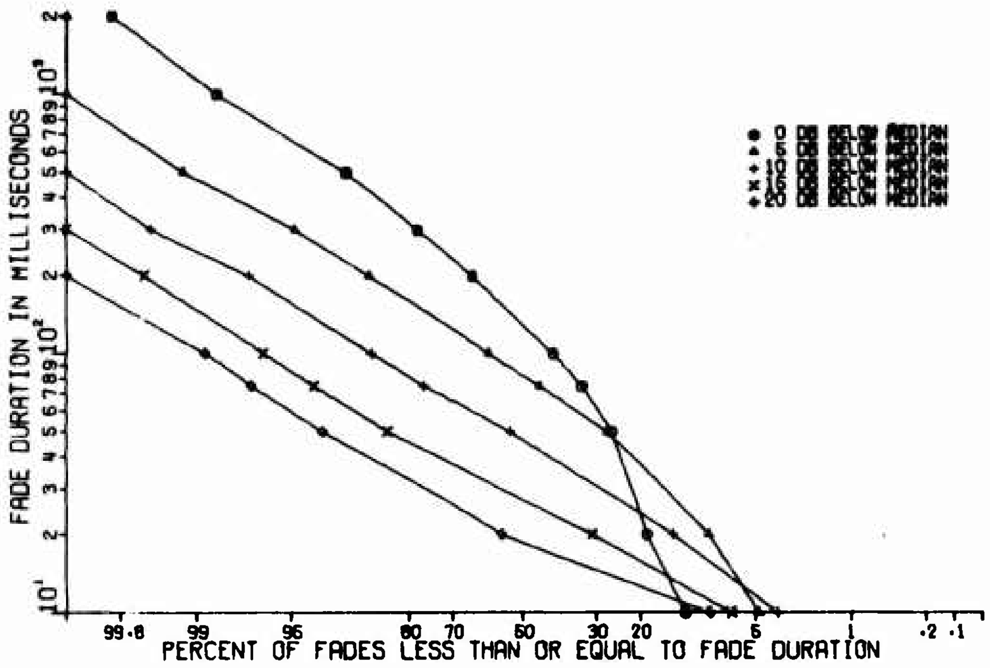
DISTRIBUTION OF FADE DURATION
WHITFORD FIELD, NOVEMBER, X-BAND
TEMPERATURE NOT OVER 49 DEGREES F., 32 TESTS

Figure 275.

3. Fade Duration Distributions - Diurnal Effects

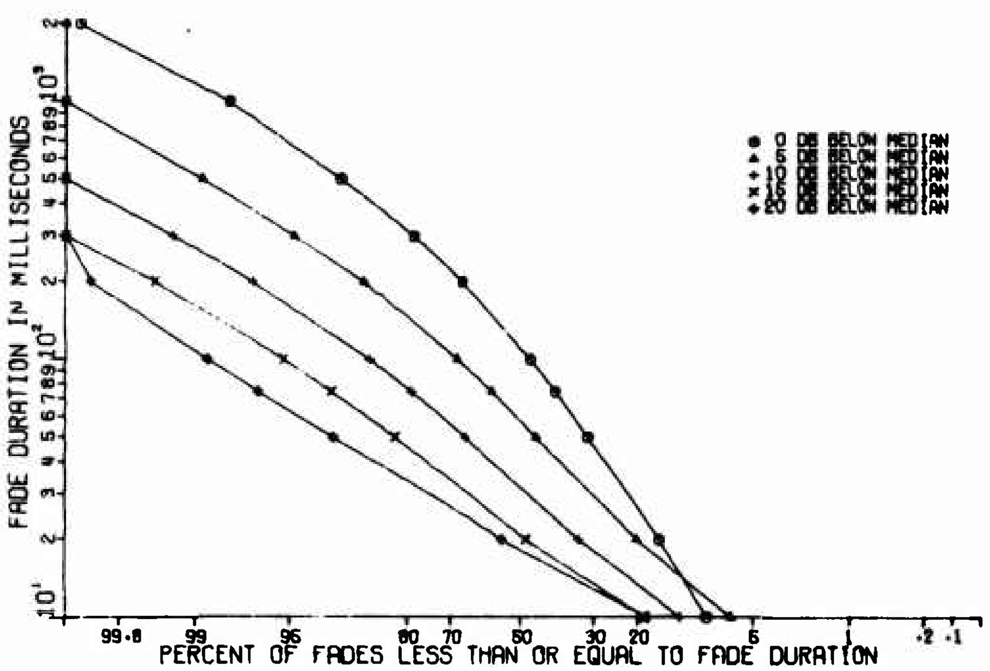
In a format similar to that of subsection VI-D-1, Figures 276 through 286 give the observed fade duration distributions but subdivided into data for four 6 hour periods through the day. These are 0001-0600, 0601-1200, 1201-1800, and 1801-2400 as shown in the figures.

Only a representative sample of all of the available data is presented here since there was no indication of any diurnal effect.



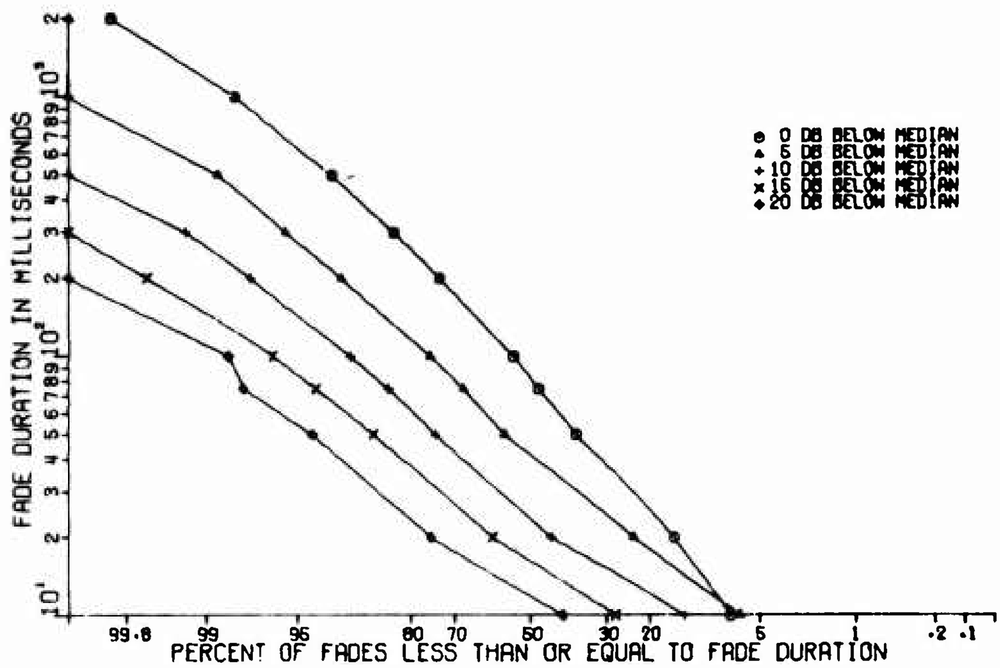
DISTRIBUTION OF FADE DURATION
POINT PETRE, SEPTEMBER, X-BAND
FROM 0001 TO 0600, 14 TESTS

Figure 276.



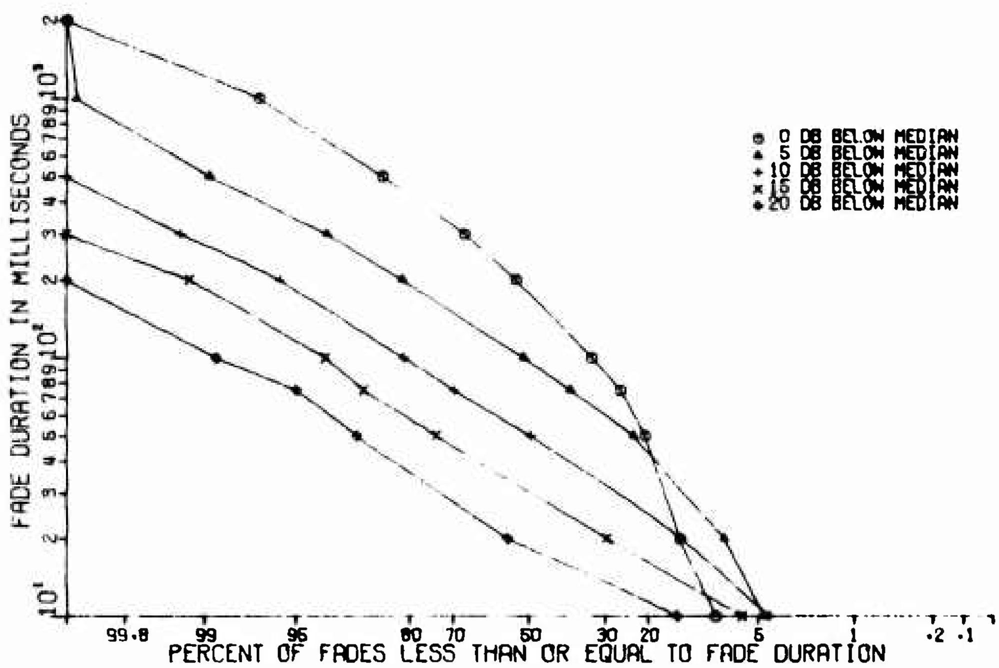
DISTRIBUTION OF FADE DURATION
POINT PETRE, SEPTEMBER, X-BAND
FROM 0601 TO 1200, 24 TESTS

Figure 277.



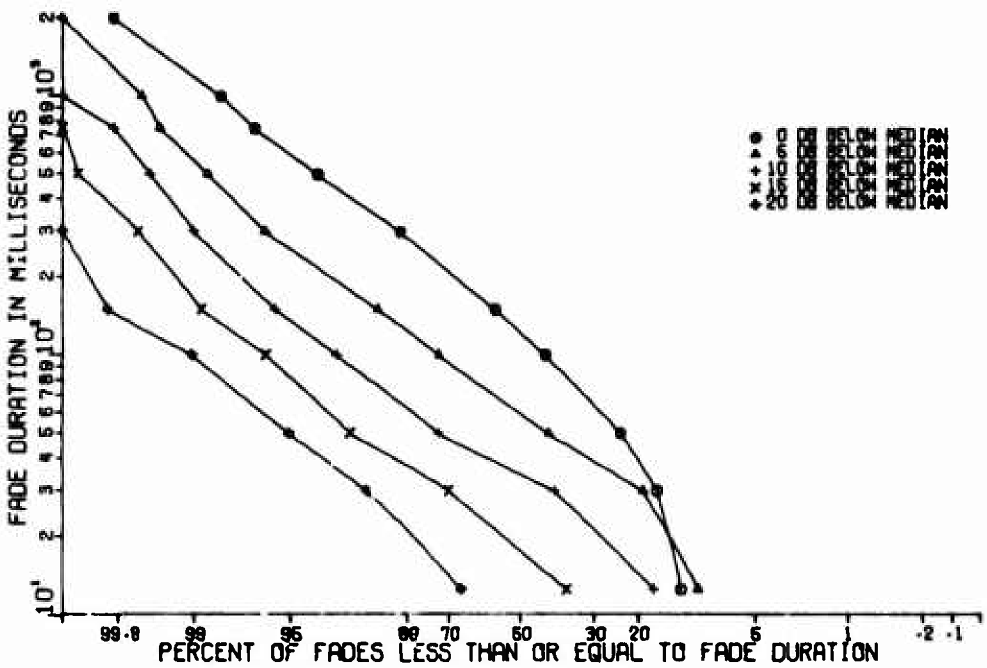
DISTRIBUTION OF FADE DURATION
POINT PETRE, SEPTEMBER, X-BAND
FROM 1201 TO 1800, 17 TESTS

Figure 278.



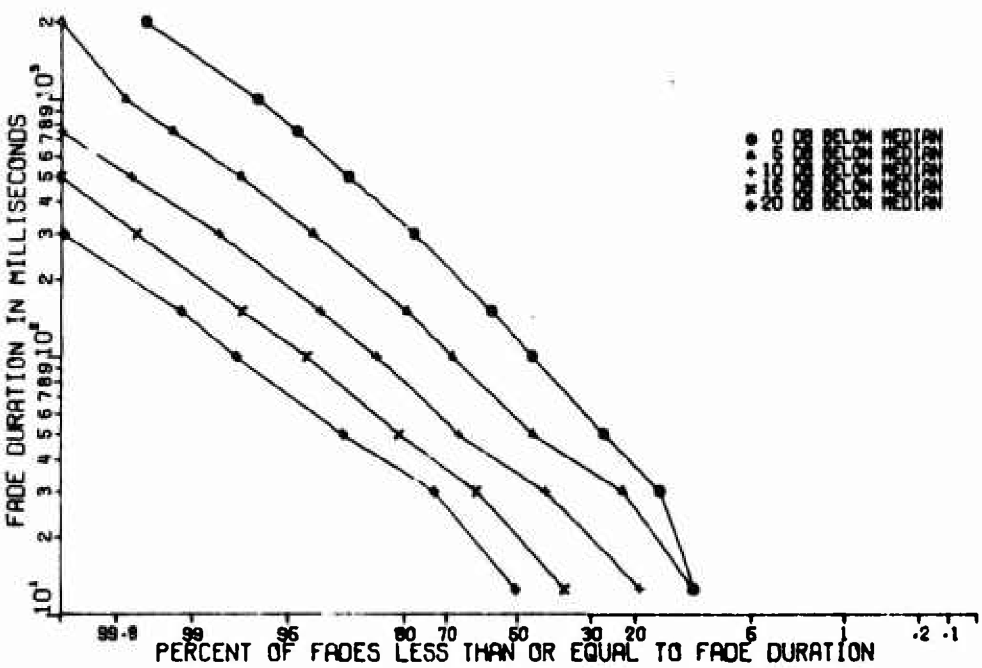
DISTRIBUTION OF FADE DURATION
POINT PETRE, SEPTEMBER, X-BAND
FROM 1301 TO 2400, 7 TESTS

Figure 279.



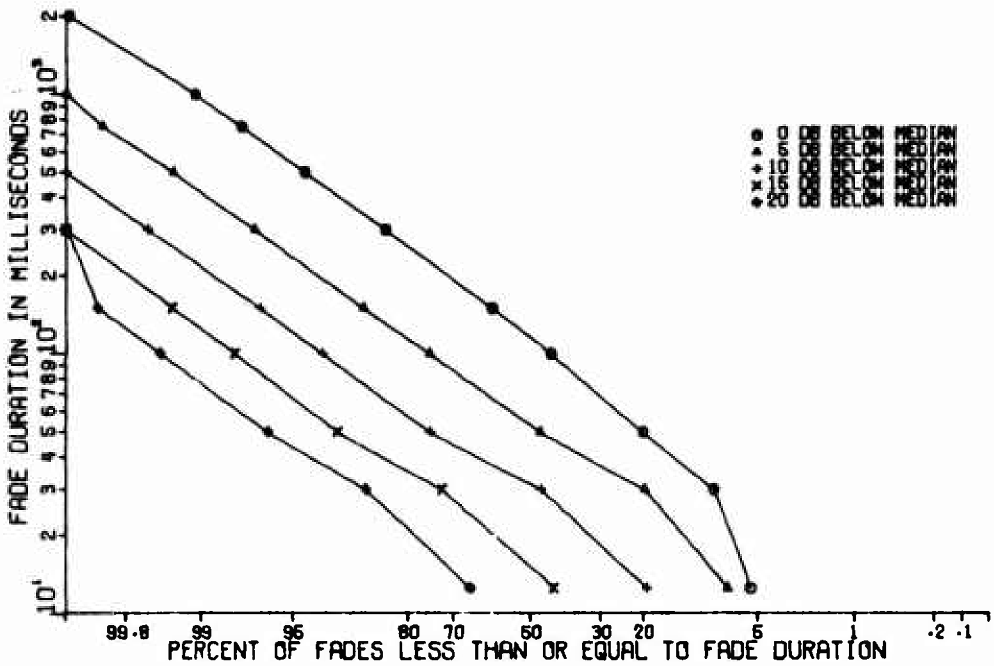
DISTRIBUTION OF FADE DURATION
ONTARIO CENTER, OCTOBER, C-BAND
FROM 0001 TO 0600, 5 TESTS

Figure 280.



DISTRIBUTION OF FADE DURATION
ONTARIO CENTER, OCTOBER, C-BAND
FROM 0601 TO 1200, 36 TESTS

Figure 281.

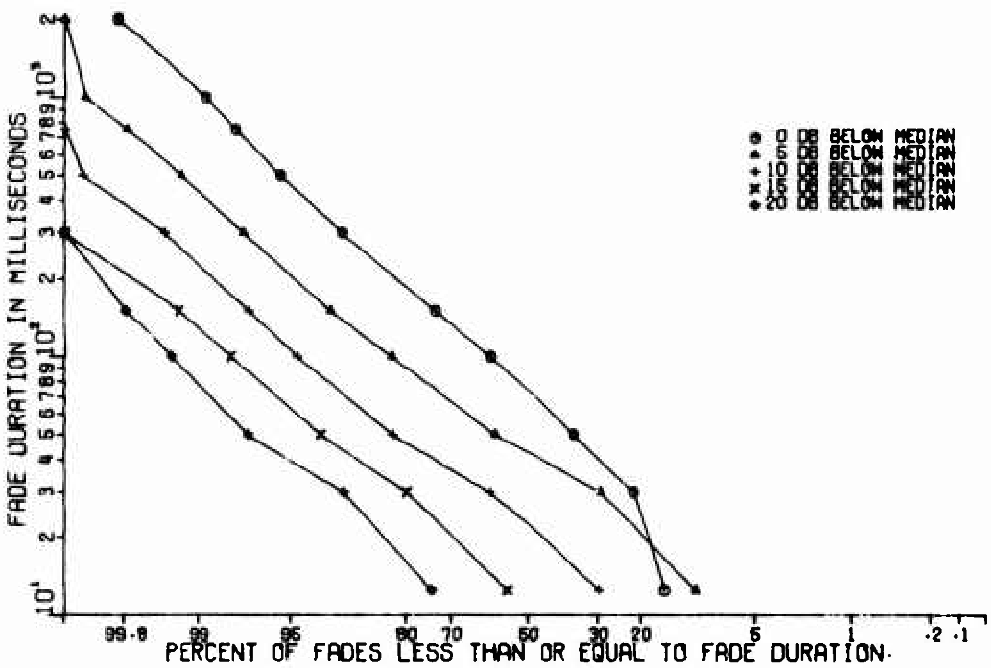


DISTRIBUTION OF FADE DURATION

ONTARIO CENTER, OCTOBER, C-BAND

FROM 1201 TO 1800, 60 TESTS

Figure 282.

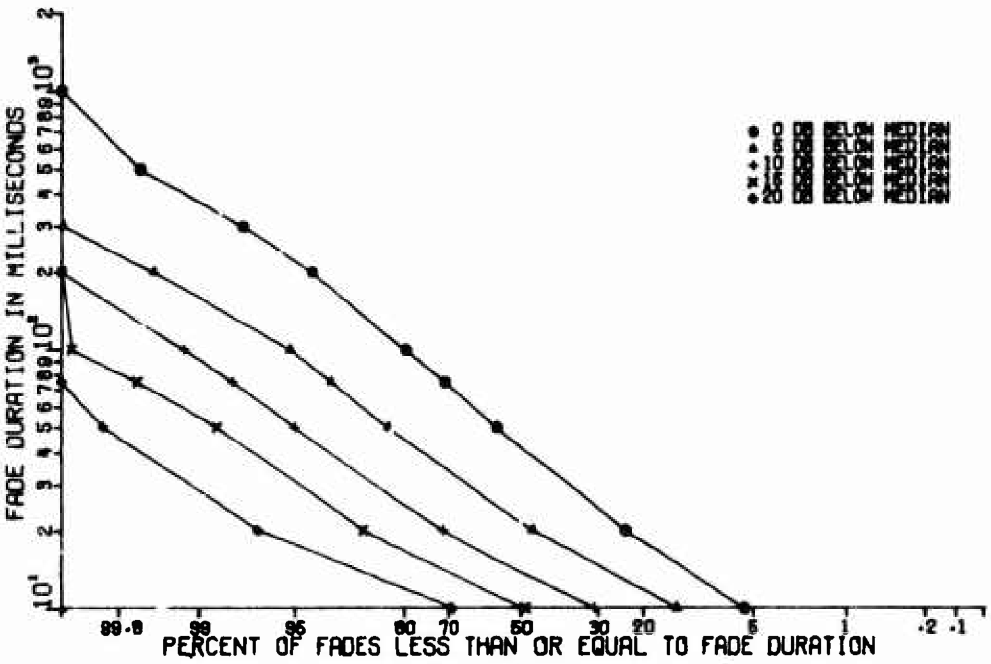


DISTRIBUTION OF FADE DURATION

ONTARIO CENTER, OCTOBER, C-BAND

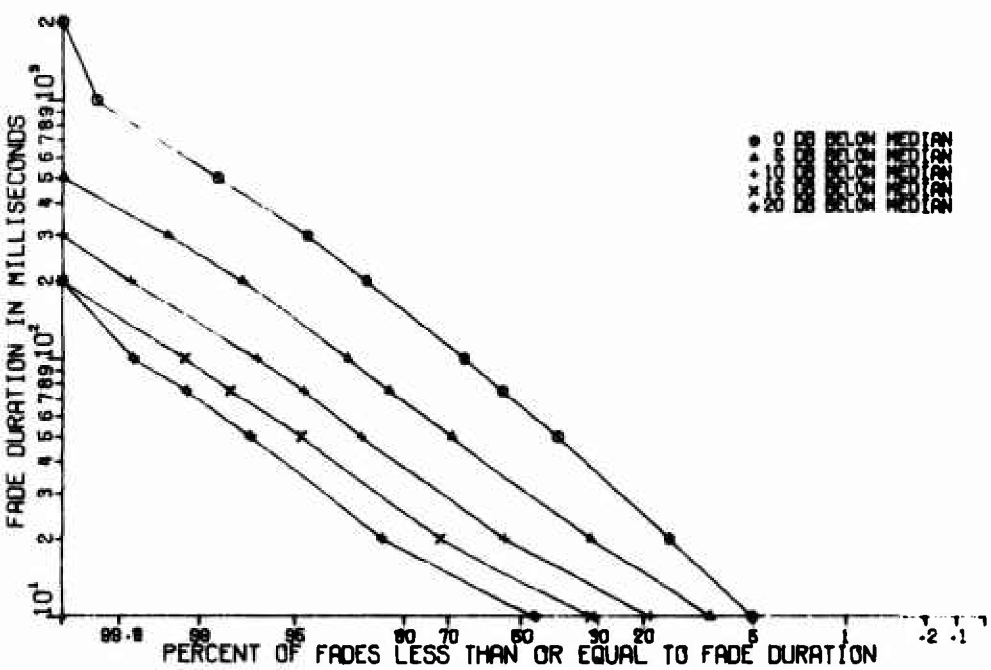
FROM 1801 TO 2400, 25 TESTS

Figure 283.



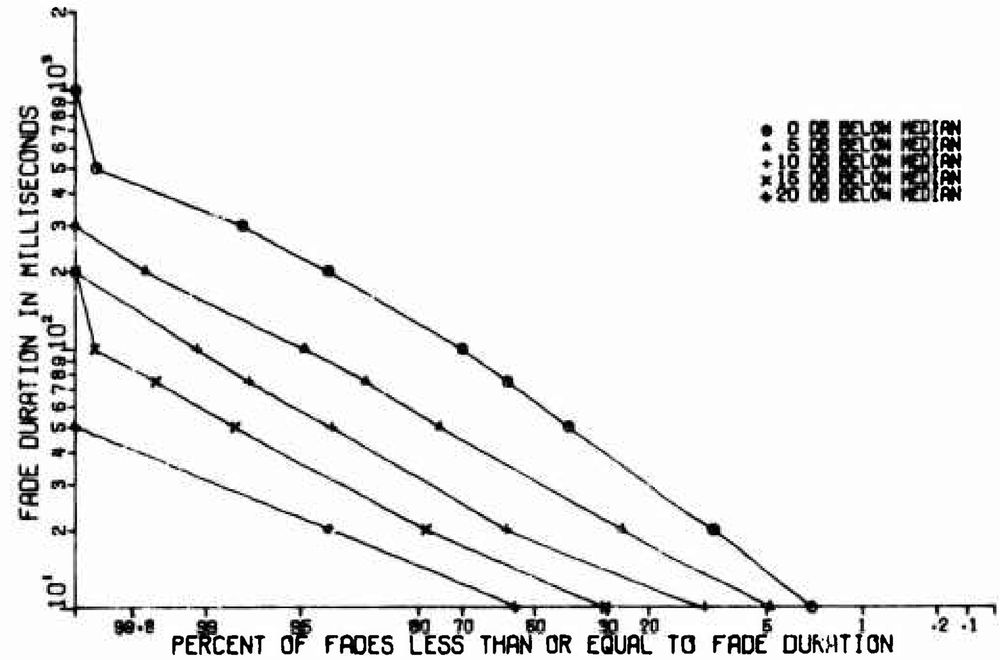
DISTRIBUTION OF FADE DURATION
WHITFORD FIELD, NOVEMBER, X-BAND
FROM 0601 TO 1200, 9 TESTS

Figure 284.



DISTRIBUTION OF FADE DURATION
WHITFORD FIELD, NOVEMBER, X-BAND
FROM 1201 TO 1800, 46 TESTS

Figure 285.



DISTRIBUTION OF FADE DURATION

WHITFORD FIELD, NOVEMBER, X-BAND

FROM 1801 TO 2400, 6 TESTS

Figure 286.

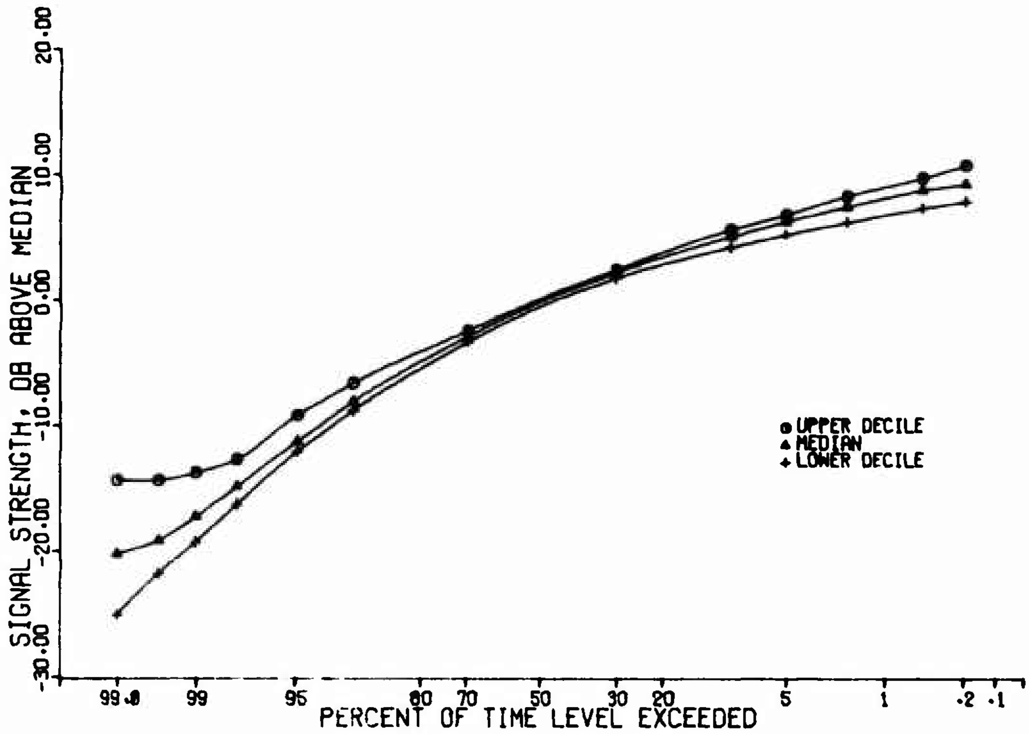
E. SIGNAL AMPLITUDE DISTRIBUTIONS

Signal amplitude distributions are shown in Figures 287 through 324. On all of these plots, cumulative percentage is plotted on a normal probability scale against variations in signal strength from the median. Only typical examples of temperature and diurnal effects on these kinds of data are shown. For those plots which are omitted from this report, either the spread of values corresponds closely to the "All" plots which are included or the range of values is similar to the temperature and diurnal effect plots which are included. The comparative spread of values is shown on the summary bar graphs at the end of this section.

1. Overall Signal Amplitude Distributions

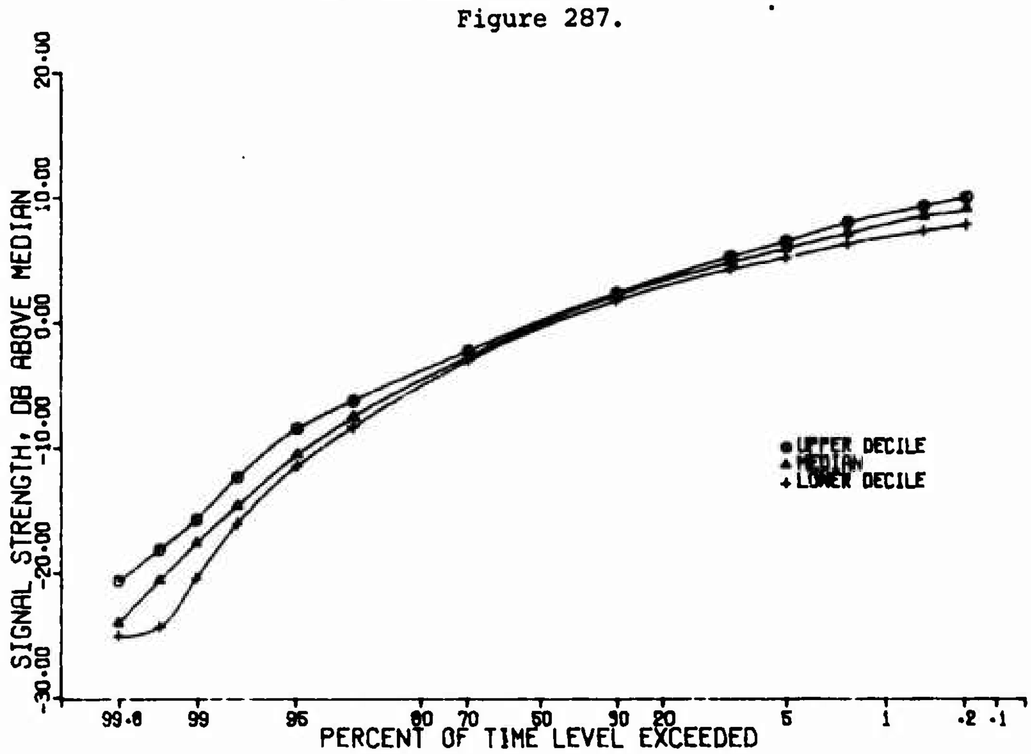
Figures 287 through 302 give the overall signal amplitude distributions over the four paths. The plots are arranged in the order of season or month, then by site, and finally by frequency band. The number of tests for each distribution is shown on the figures. For all cases where sufficient data was available the upper and lower deciles have been plotted in addition to the medians.

For all paths the signal amplitude distributions are similar and no seasonal dependence is evident. The median curves as plotted on this log-normal scale yield distributions that are usually Rayleigh.



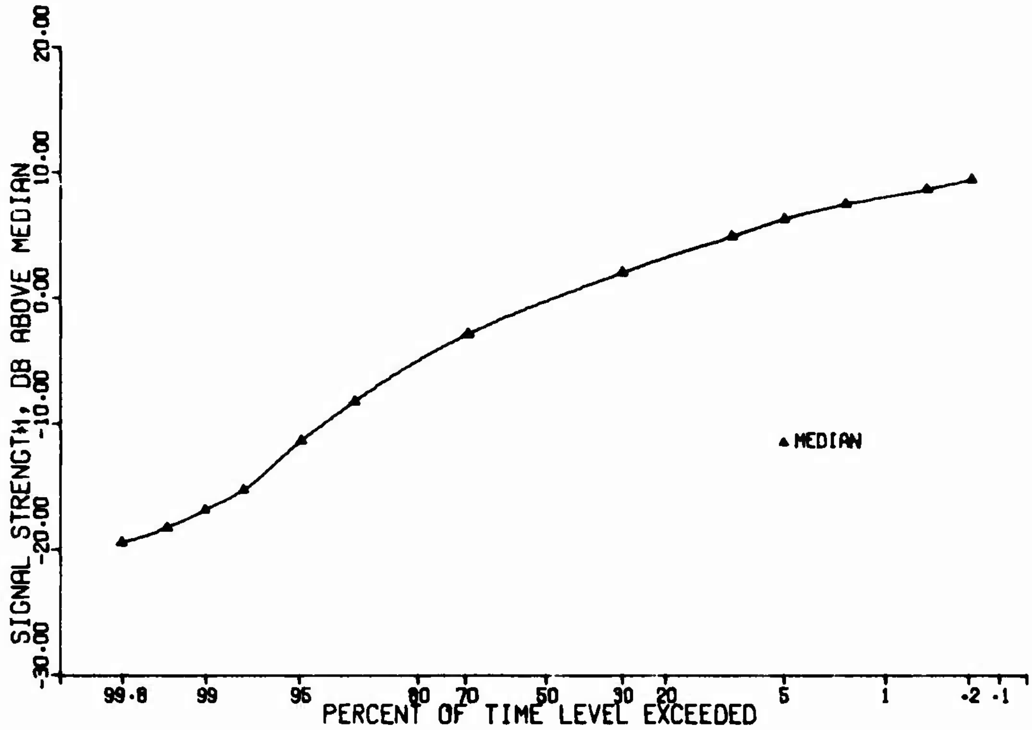
SIGNAL AMPLITUDE DISTRIBUTION
ONTARIO CENTER, SUMMER, X-BAND
ALL, 83 TESTS

Figure 287.



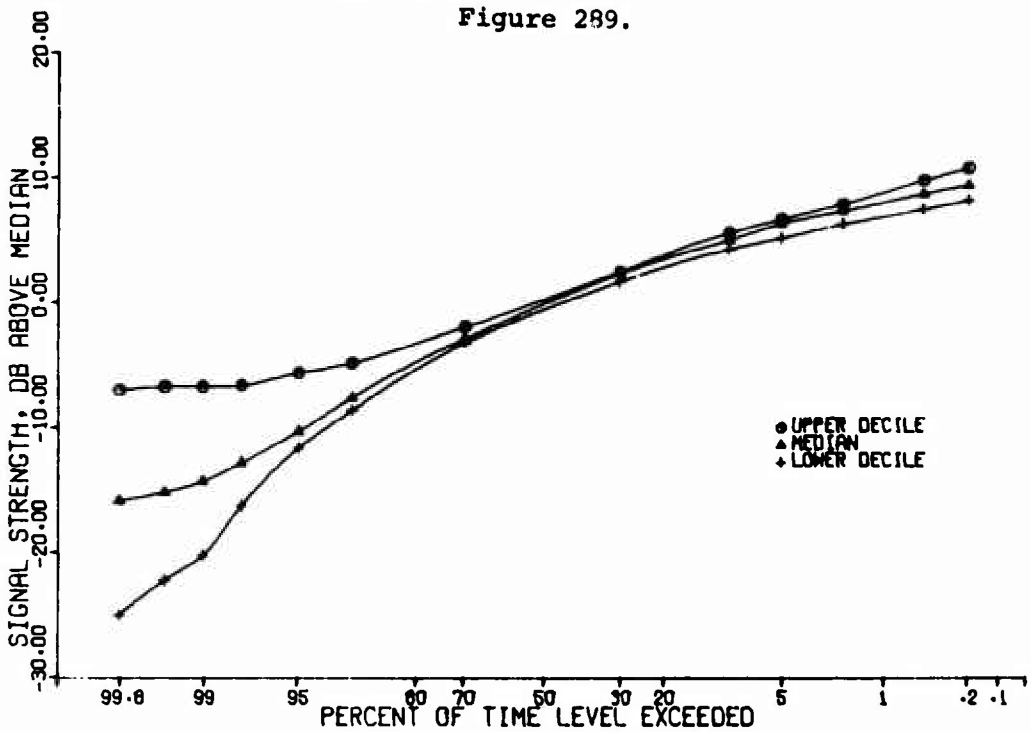
SIGNAL AMPLITUDE DISTRIBUTION
ONTARIO CENTER, SUMMER, C-BAND
ALL, 45 TESTS

Figure 288.



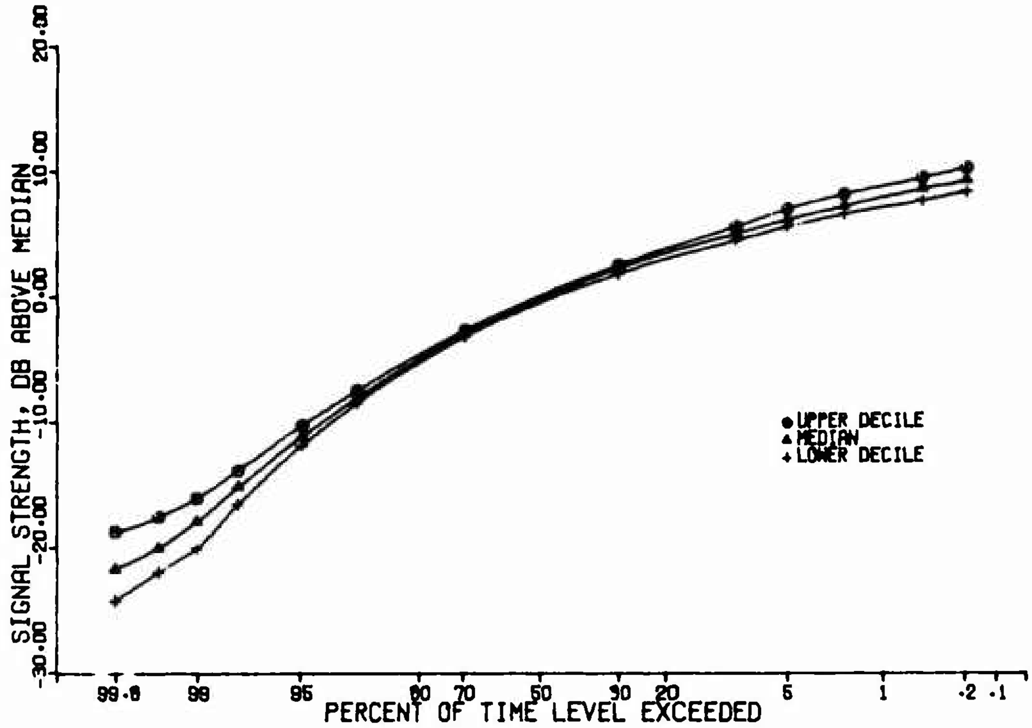
SIGNAL AMPLITUDE DISTRIBUTION
WHITFORD FIELD, SUMMER, X-BAND
ALL, 9 TESTS

Figure 289.



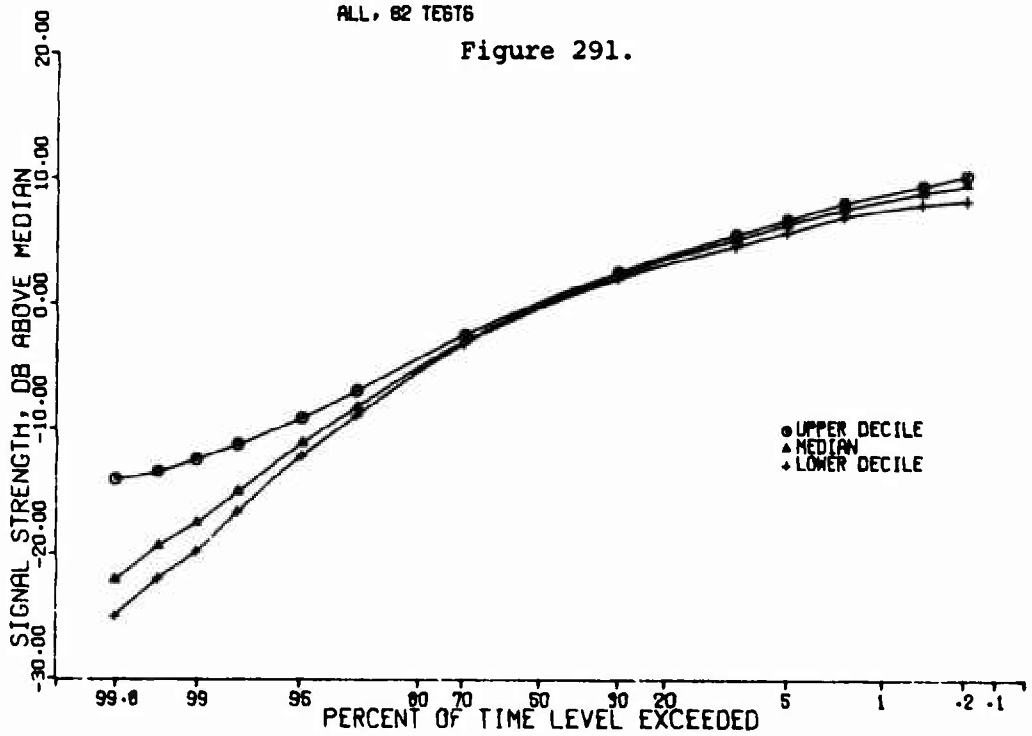
SIGNAL AMPLITUDE DISTRIBUTION
WHITFORD FIELD, SUMMER, C-BAND
ALL, 30 TESTS

Figure 290.



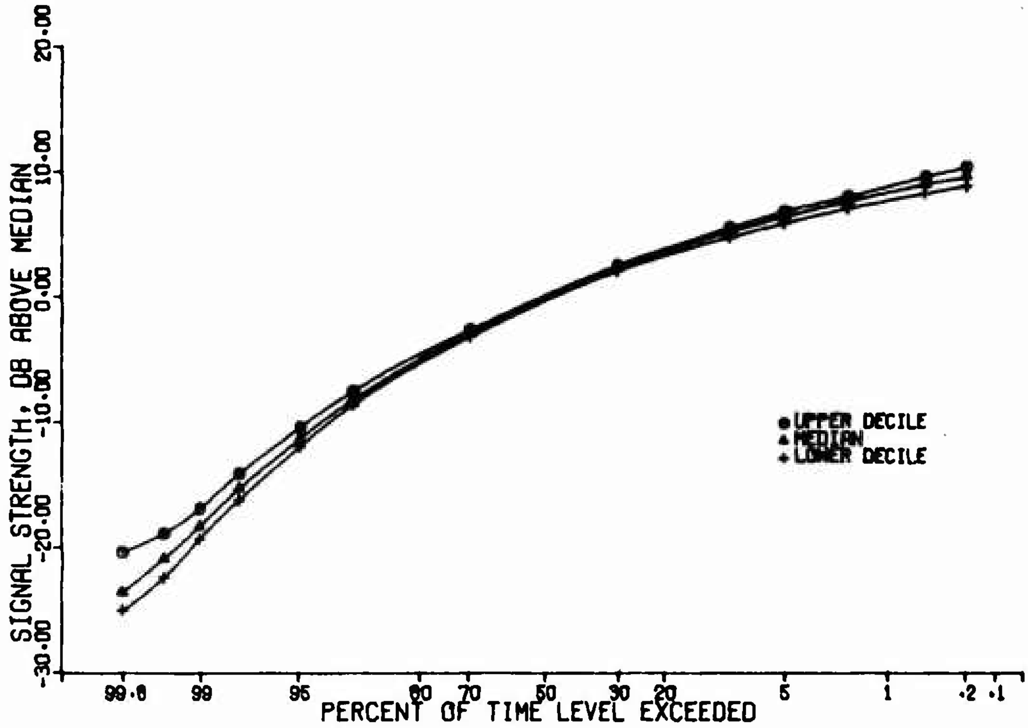
SIGNAL AMPLITUDE DISTRIBUTION
POINT PETRE, SEPTEMBER, X-BAND
ALL, 62 TESTS

Figure 291.



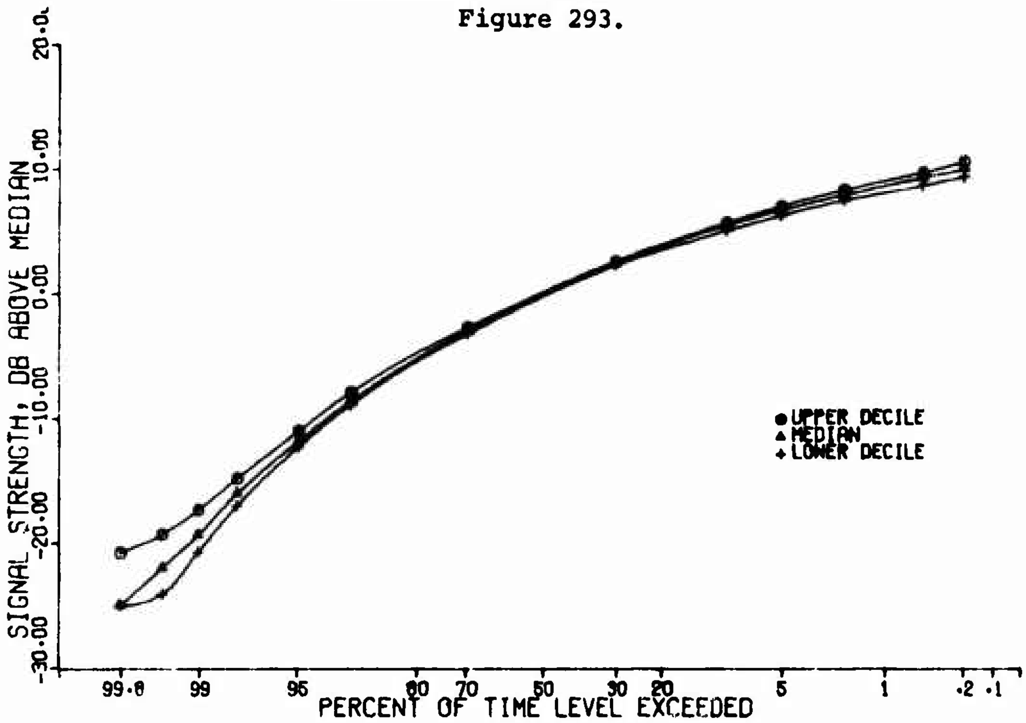
SIGNAL AMPLITUDE DISTRIBUTION
POINT PETRE, SEPTEMBER, C-BAND
ALL, 73 TESTS

Figure 292.



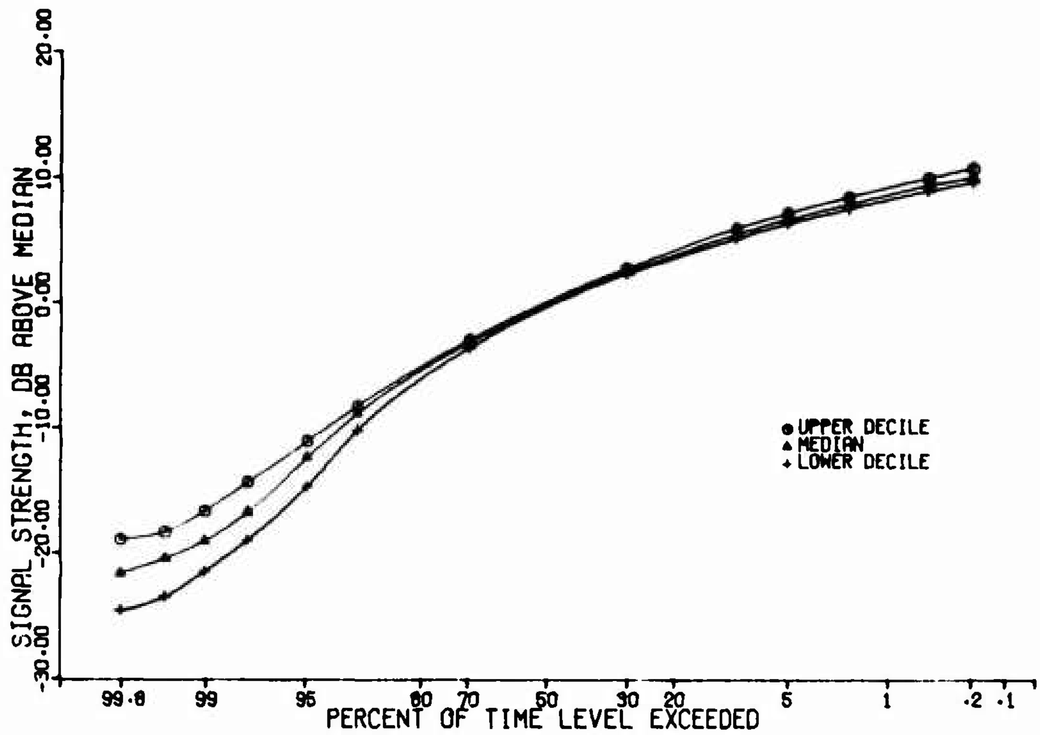
SIGNAL AMPLITUDE DISTRIBUTION
ONTARIO CENTER, OCTOBER, X-BAND
ALL, 114 TESTS

Figure 293.



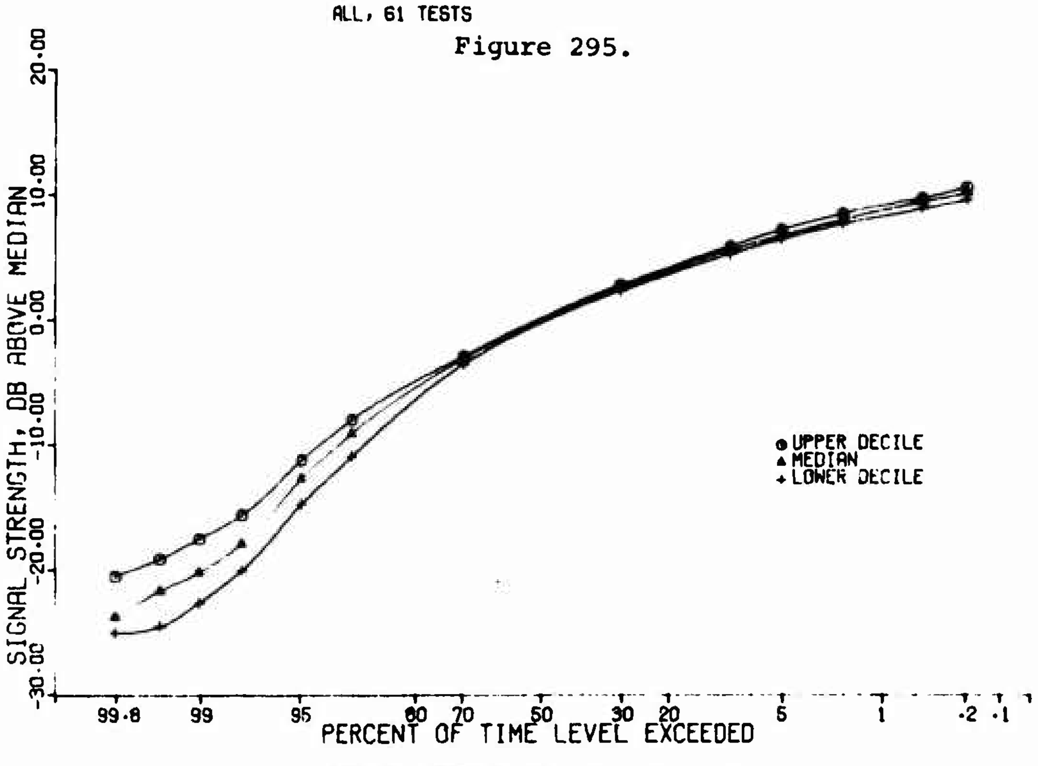
SIGNAL AMPLITUDE DISTRIBUTION
ONTARIO CENTER, OCTOBER, C-BAND
ALL, 126 TESTS

Figure 294.



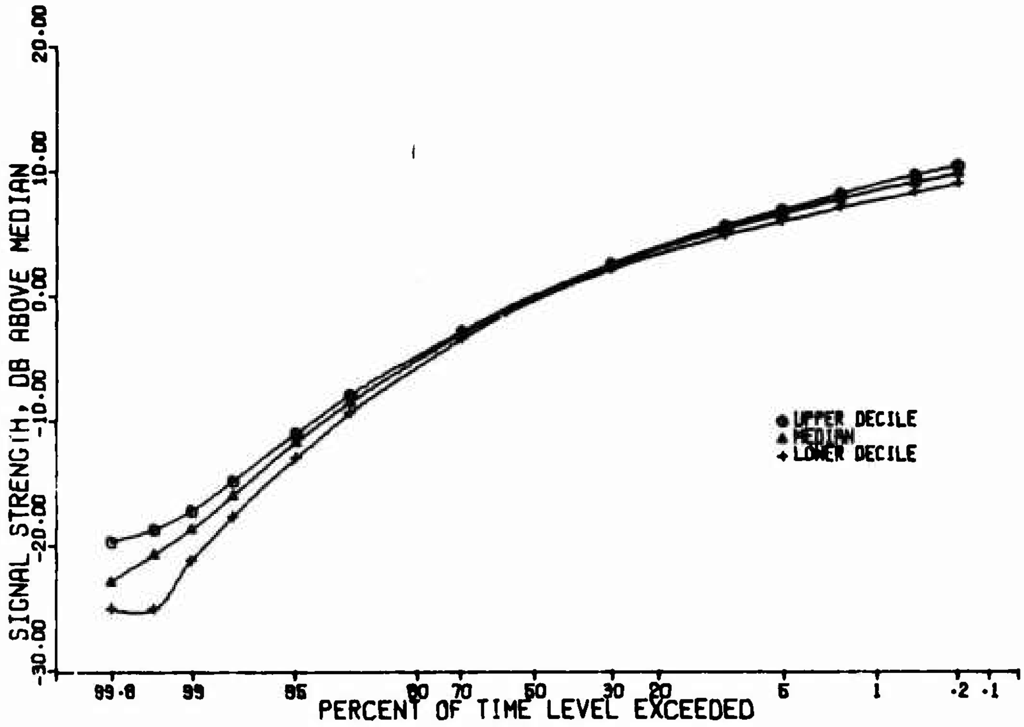
SIGNAL AMPLITUDE DISTRIBUTION
WHITFORD FIELD, NOVEMBER, X-BAND
ALL, 61 TESTS

Figure 295.



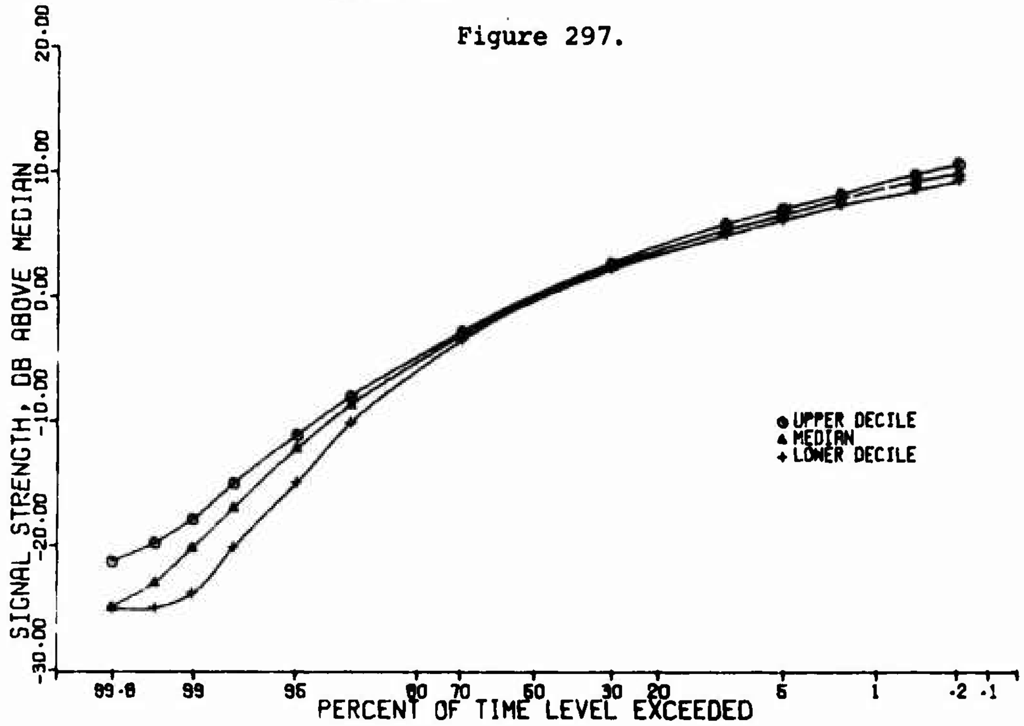
SIGNAL AMPLITUDE DISTRIBUTION
WHITFORD FIELD, NOVEMBER, C-BAND
ALL, 41 TESTS

Figure 296.



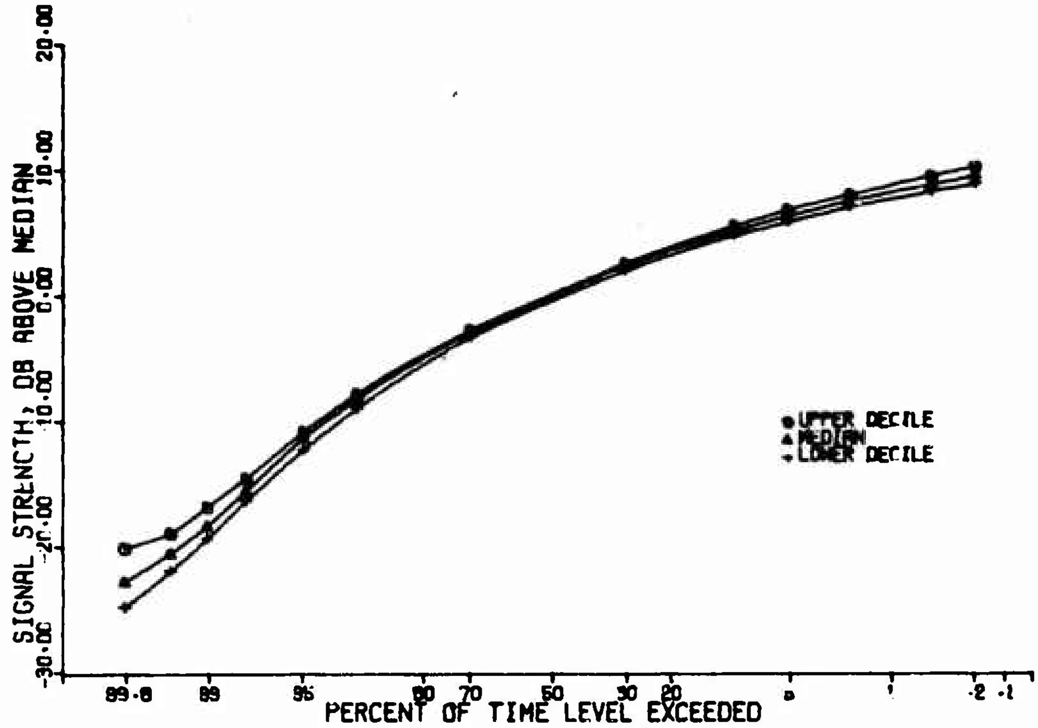
SIGNAL AMPLITUDE DISTRIBUTION
POINT PETRE, WINTER, X-BAND
ALL, 80 TESTS

Figure 297.



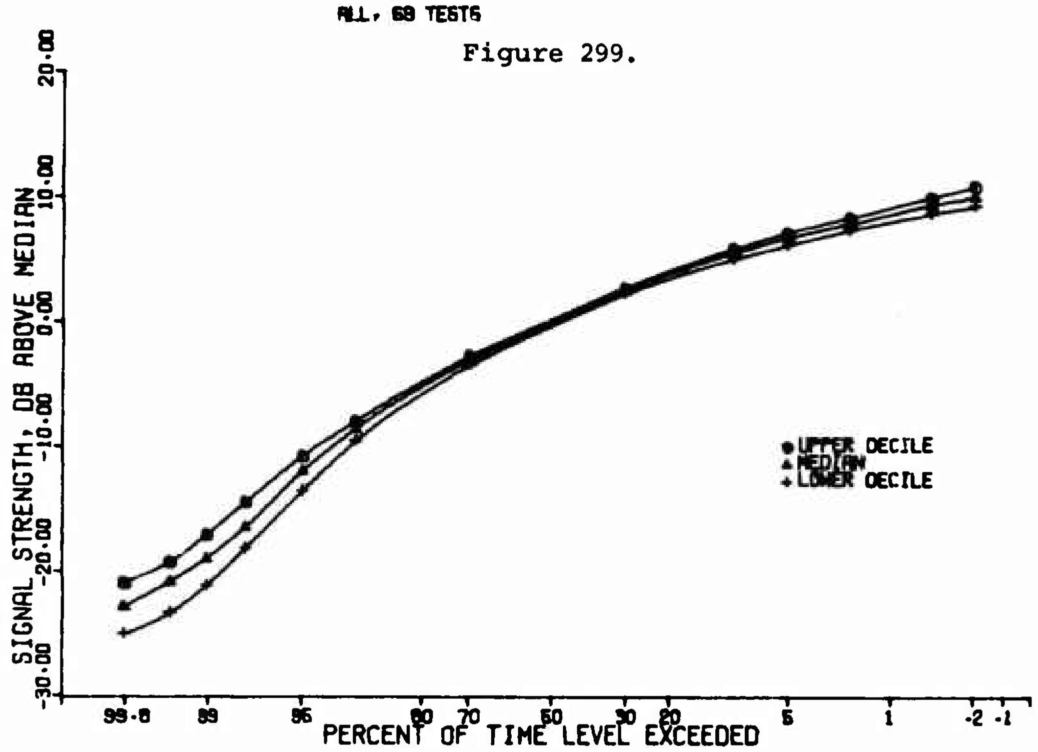
SIGNAL AMPLITUDE DISTRIBUTION
POINT PETRE, WINTER, C-BAND
ALL, 102 TESTS

Figure 298.



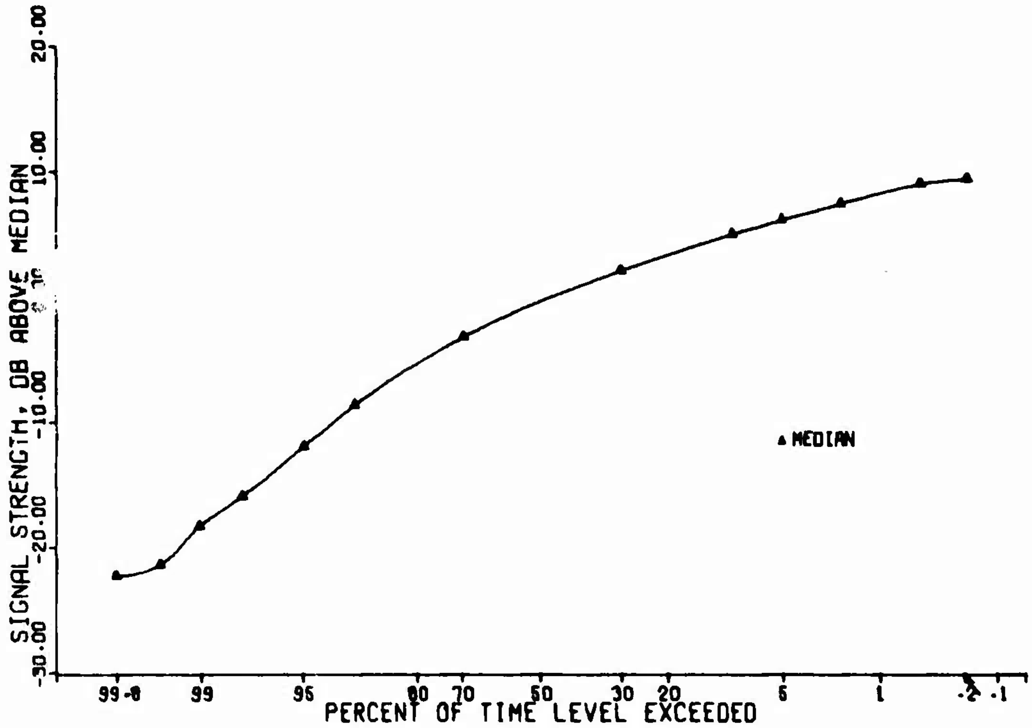
SIGNAL AMPLITUDE DISTRIBUTION
ONTARIO CENTER, WINTER, X-BAND
ALL, 68 TESTS

Figure 299.



SIGNAL AMPLITUDE DISTRIBUTION
ONTARIO CENTER, WINTER, C-BAND
ALL, 57 TESTS

Figure 300.

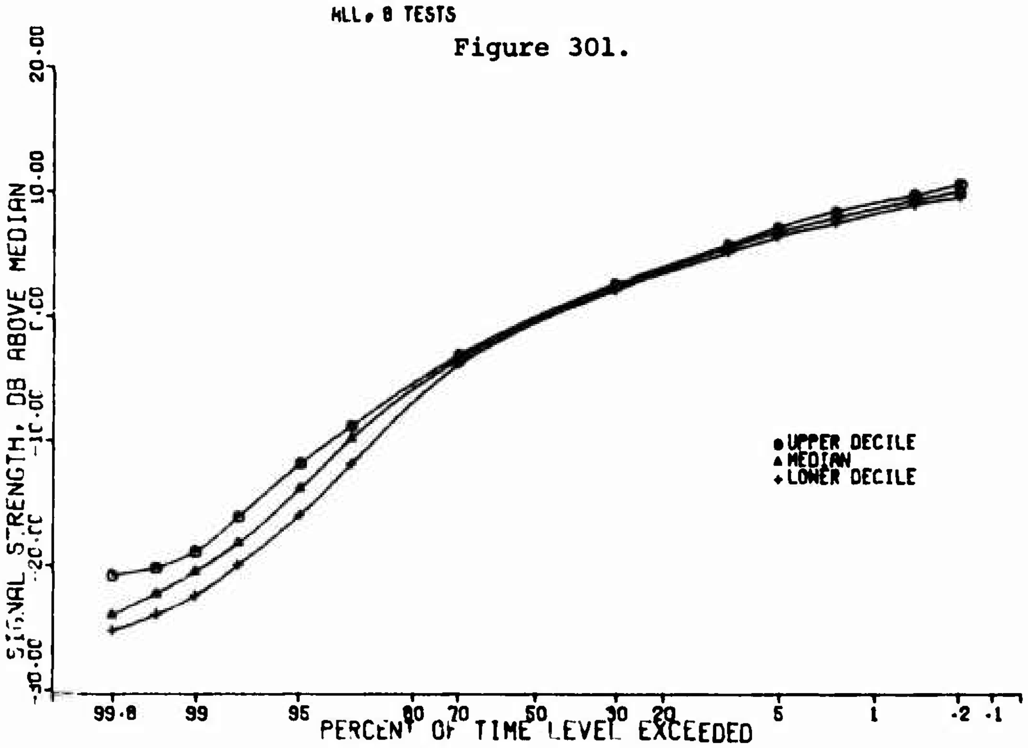


SIGNAL AMPLITUDE DISTRIBUTION

PORT BYRON, FEBRUARY, X-BAND

ALL, 8 TESTS

Figure 301.



SIGNAL AMPLITUDE DISTRIBUTION

PORT BYRON, FEBRUARY, C-BAND

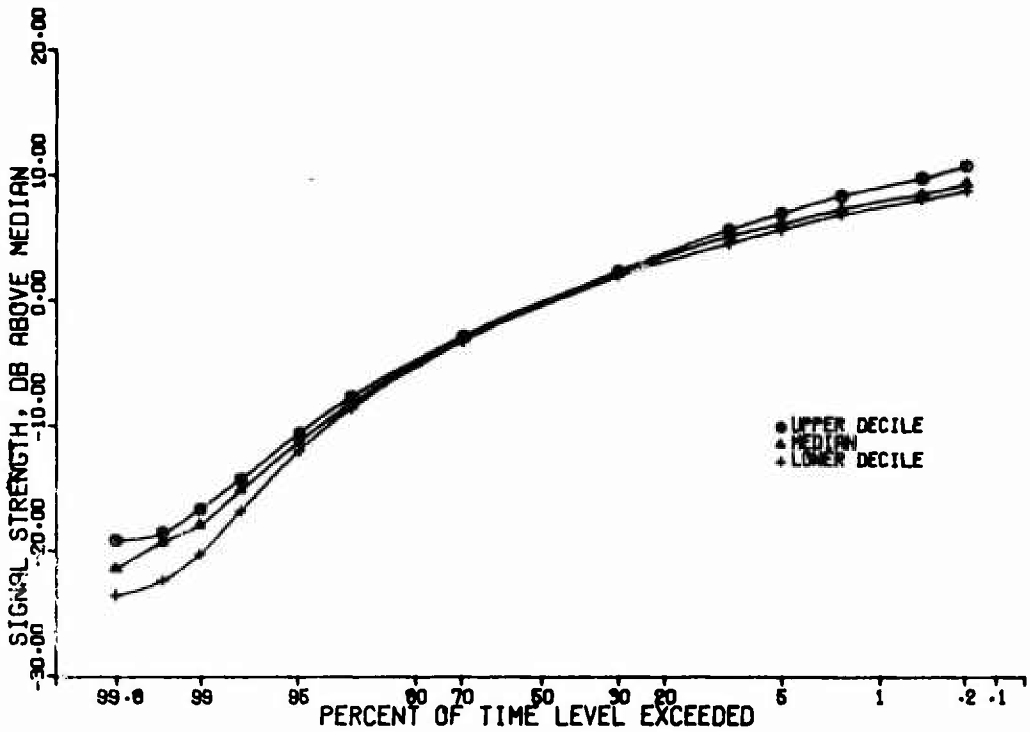
ALL, 49 TESTS

Figure 302.

2. Signal Amplitude Distributions - Temperature Effects

In a format similar to the preceding subsection, Figures 303 through 310 show the observed signal amplitude distributions but subdivided into two Fahrenheit temperature ranges. These temperature ranges are given on the figures and were chosen so that the crossover point is approximately the average temperature for the time and location of the measurements.

The figures shown are representative and indicate no temperature effect on the signal amplitude distribution.

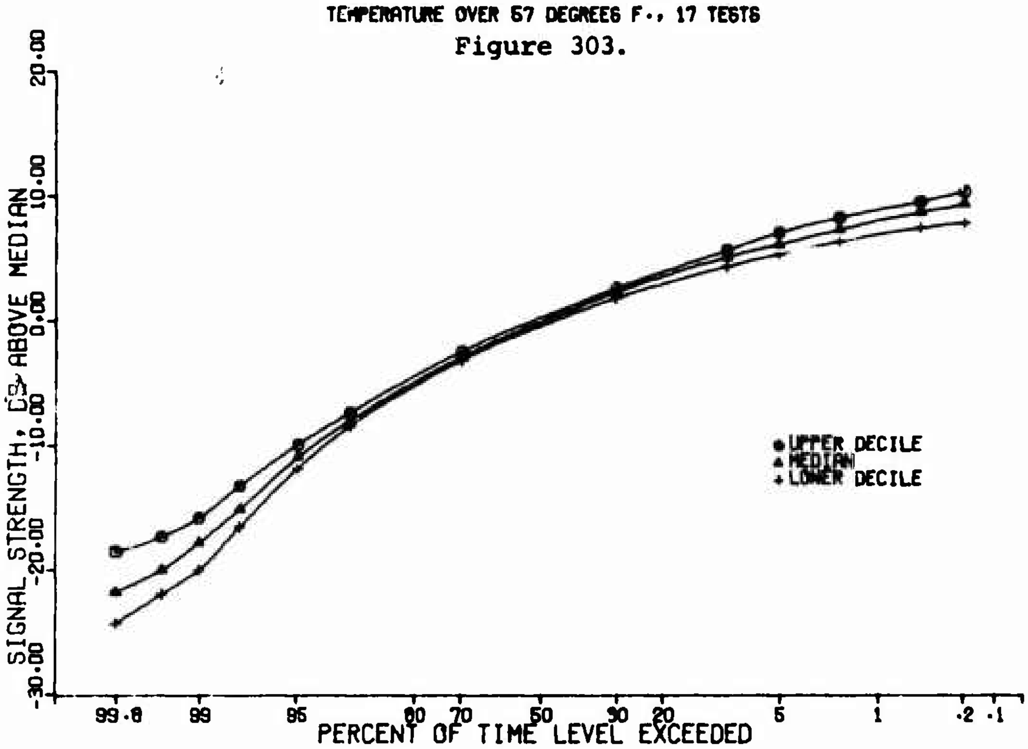


SIGNAL AMPLITUDE DISTRIBUTION

POINT PETRE, SEPTEMBER, X-BAND

TEMPERATURE OVER 57 DEGREES F., 17 TESTS

Figure 303.

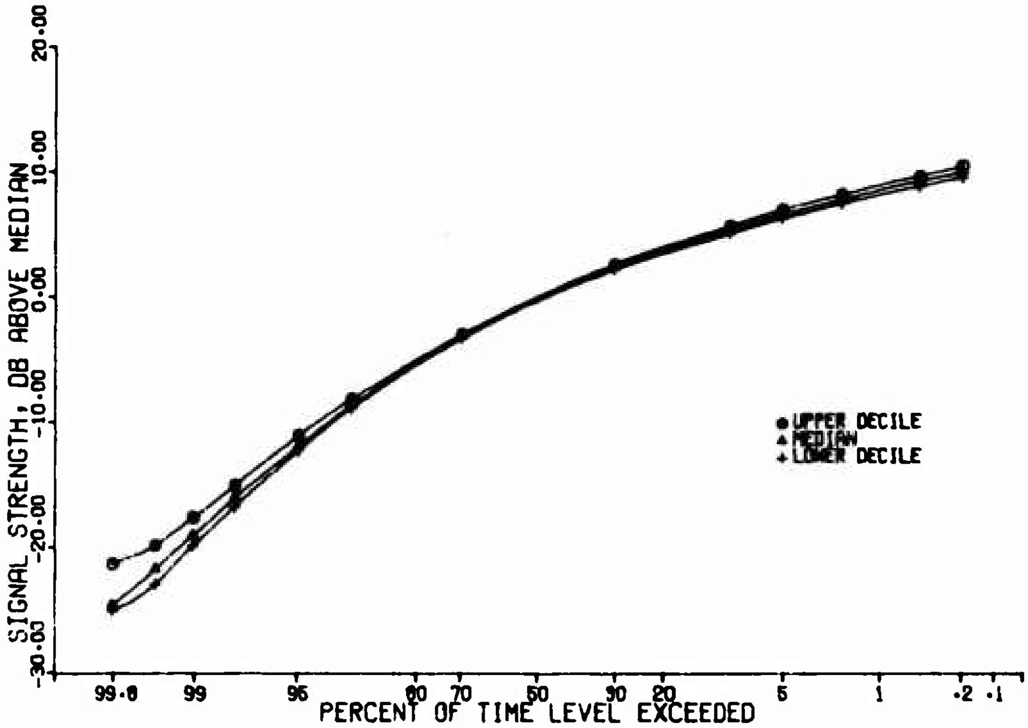


SIGNAL AMPLITUDE DISTRIBUTION

POINT PETRE, SEPTEMBER, X-BAND

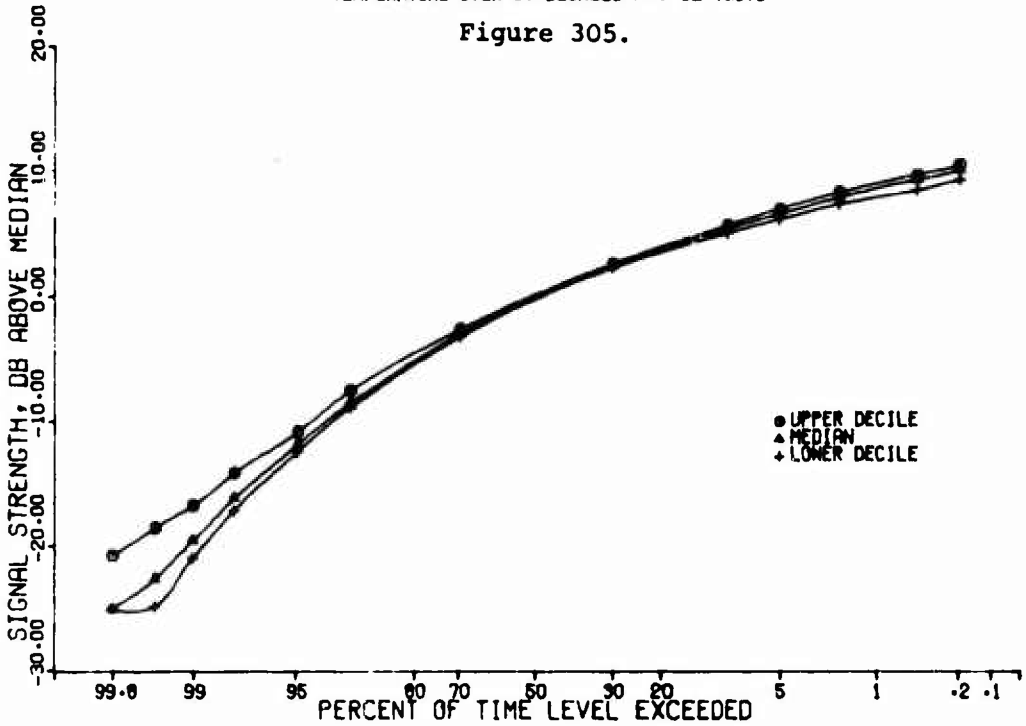
TEMPERATURE NOT OVER 57 DEGREES F., 46 TESTS

Figure 304.



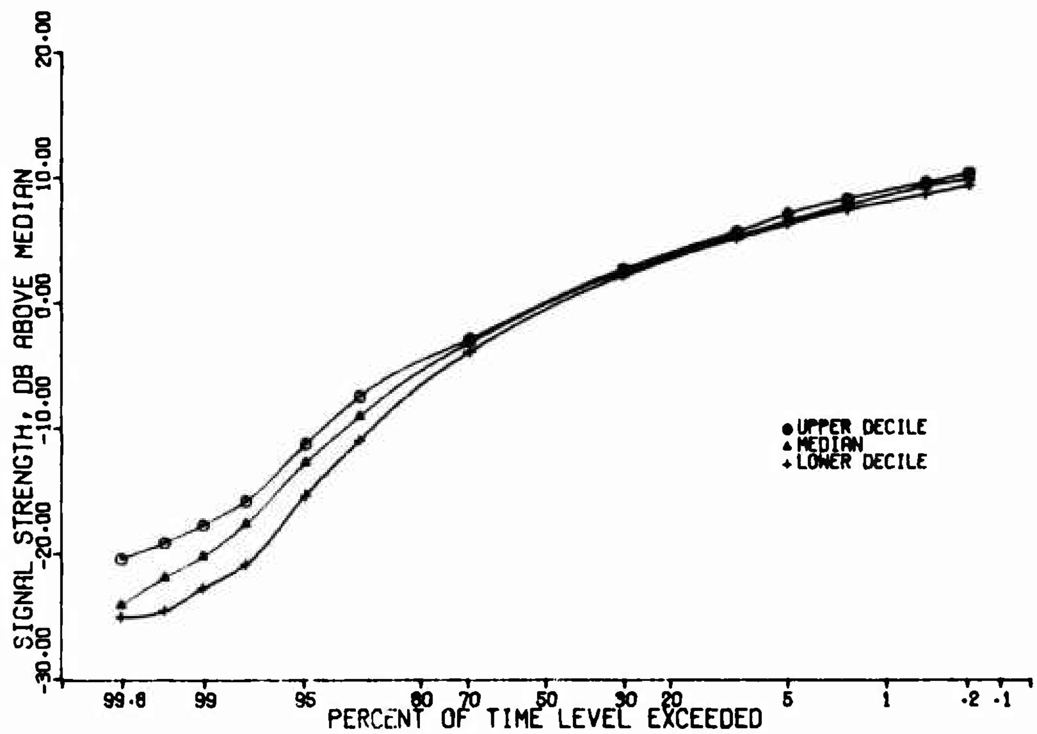
SIGNAL AMPLITUDE DISTRIBUTION
ONTARIO CENTER, OCTOBER, C-BAND
TEMPERATURE OVER 57 DEGREES F., 62 TESTS

Figure 305.



SIGNAL AMPLITUDE DISTRIBUTION
ONTARIO CENTER, OCTOBER, C-BAND
TEMPERATURE NOT OVER 57 DEGREES F., 64 TESTS

Figure 306.



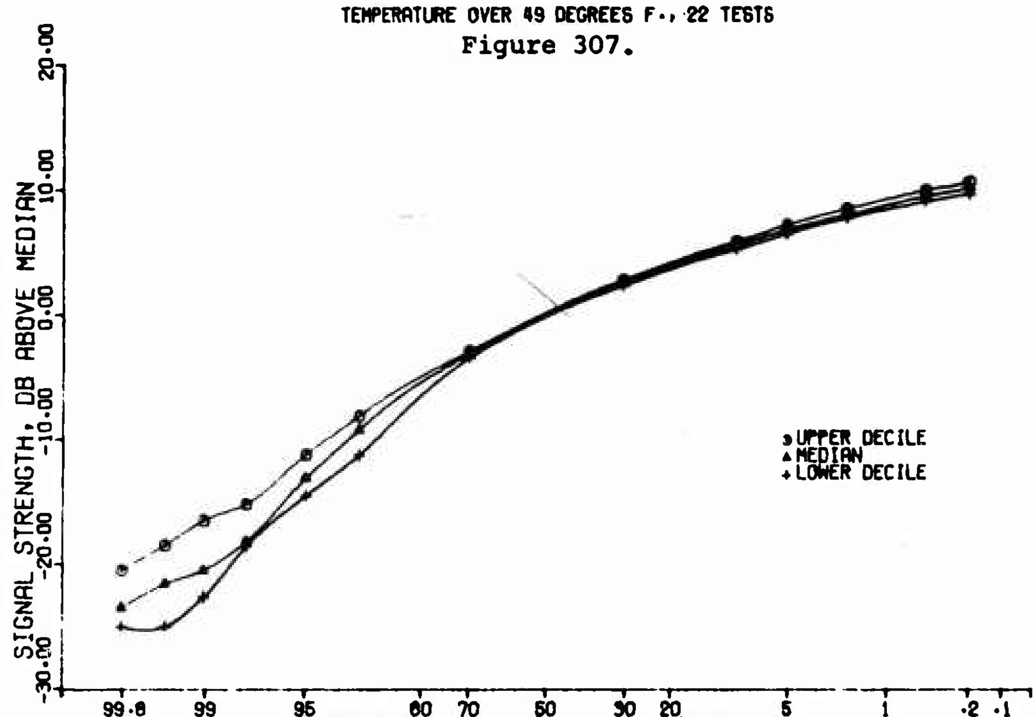
PERCENT OF TIME LEVEL EXCEEDED

SIGNAL AMPLITUDE DISTRIBUTION

WHITFORD FIELD, NOVEMBER, C-BAND

TEMPERATURE OVER 49 DEGREES F., 22 TESTS

Figure 307.



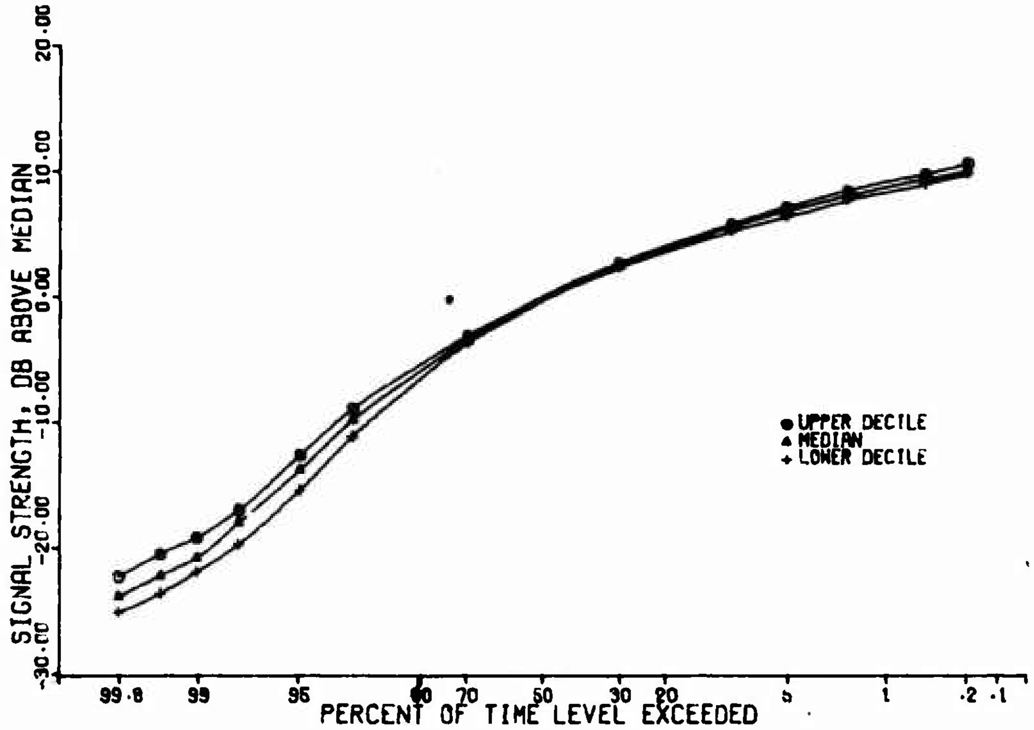
PERCENT OF TIME LEVEL EXCEEDED

SIGNAL AMPLITUDE DISTRIBUTION

WHITFORD FIELD, NOVEMBER, C-BAND

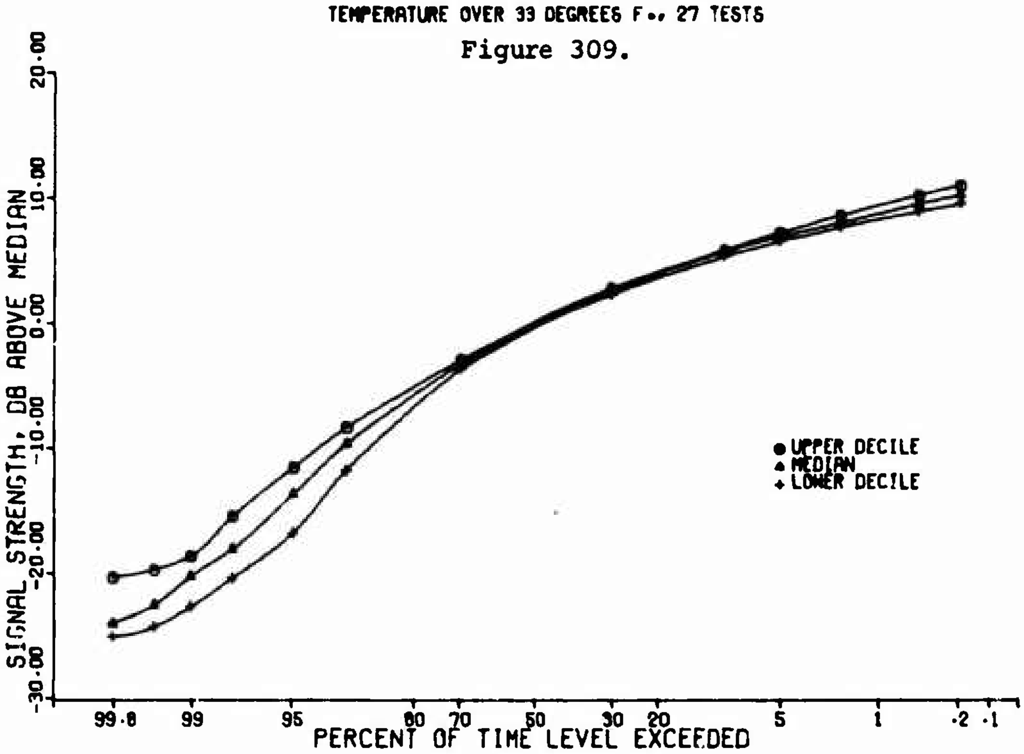
TEMPERATURE NOT OVER 49 DEGREES F., 19 TESTS

Figure 308.



SIGNAL AMPLITUDE DISTRIBUTION
PORT BYRON, FEBRUARY, C-BAND
TEMPERATURE OVER 33 DEGREES F., 27 TESTS

Figure 309.



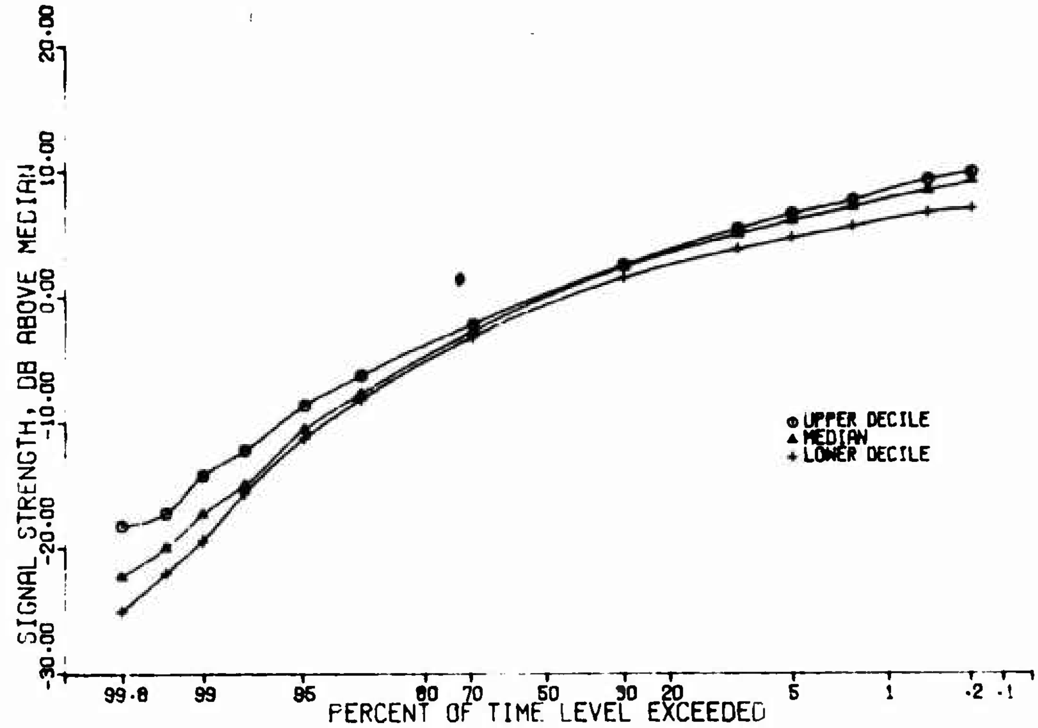
SIGNAL AMPLITUDE DISTRIBUTION
PORT BYRON, FEBRUARY, C-BAND
TEMPERATURE NOT OVER 33 DEGREES F., 22 TESTS

Figure 310.

3. Signal Amplitude Distributions - Diurnal Effects

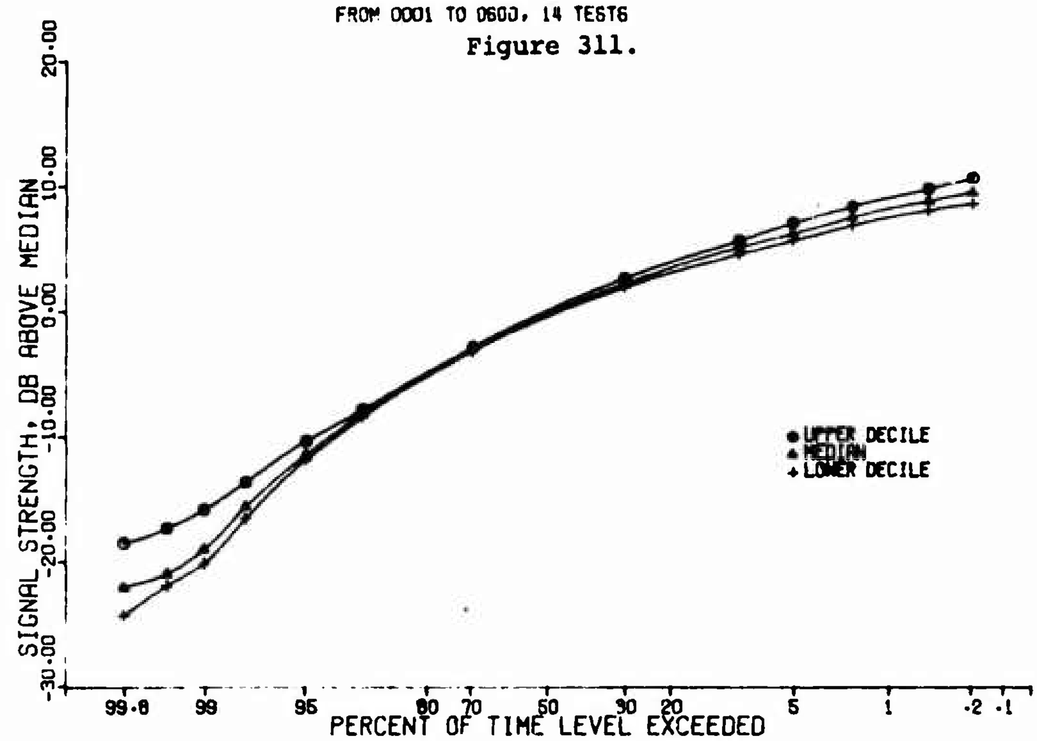
In a format similar to that of subsection VI-E-1, Figures 311 through 324 show the observed signal amplitude distributions but subdivided into four 6 hour periods through the day. These are 0001-0600, 0601-1200, 1201-1800, and 1801-2400 as shown in the figures.

Only a representative sample of all of the available data is presented here since there was no indication of any diurnal effect. The upper decile Ontario Center, October, C-band (Figure 318) is not statistically significant since it was contributed by only two tests.



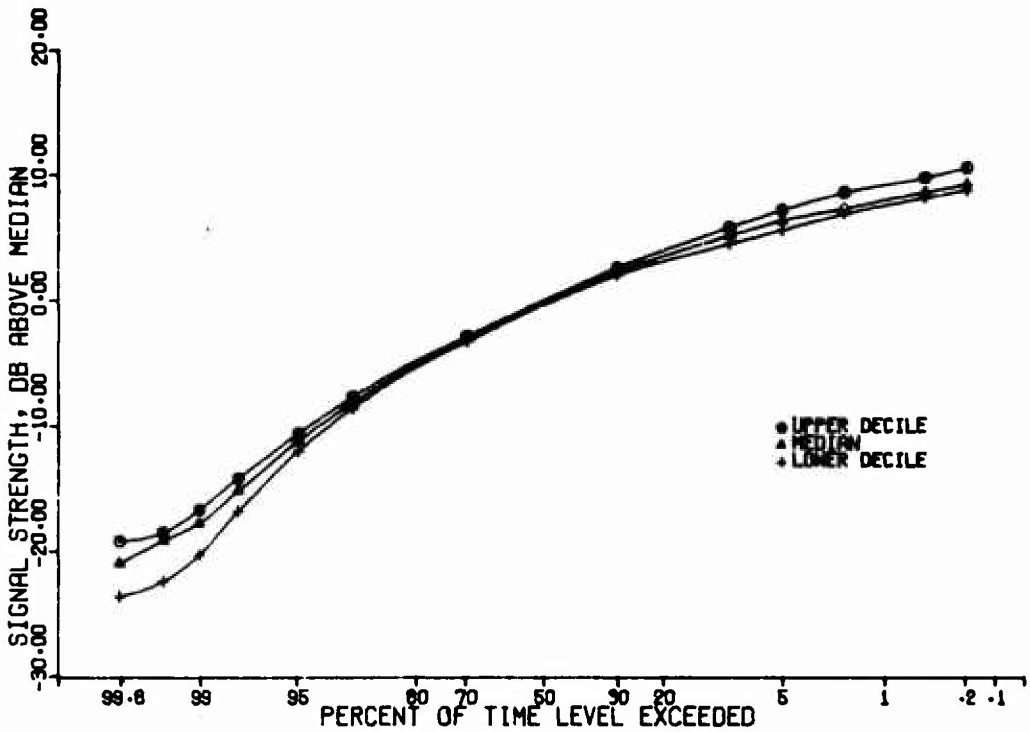
SIGNAL AMPLITUDE DISTRIBUTION
POINT PETRE, SEPTEMBER, X-BAND
FROM 0001 TO 0600, 14 TESTS

Figure 311.



SIGNAL AMPLITUDE DISTRIBUTION
POINT PETRE, SEPTEMBER, X-BAND
FROM 0601 TO 1200, 24 TESTS

Figure 312.

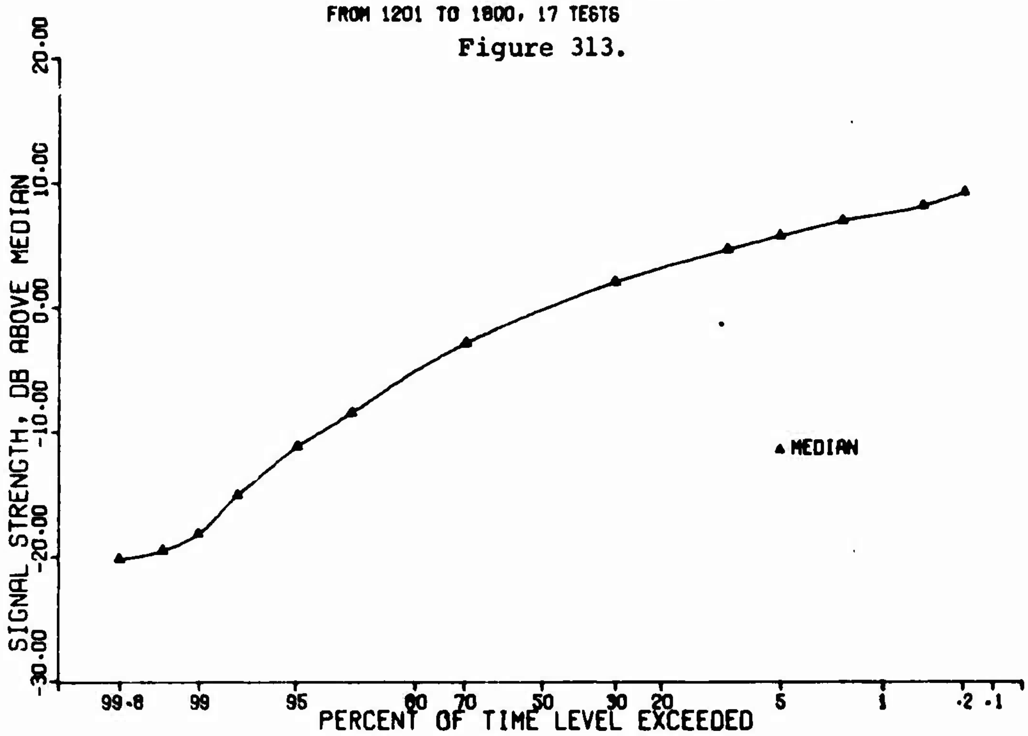


SIGNAL AMPLITUDE DISTRIBUTION

POINT PETRE, SEPTEMBER, X-BAND

FROM 1201 TO 1800, 17 TESTS

Figure 313.

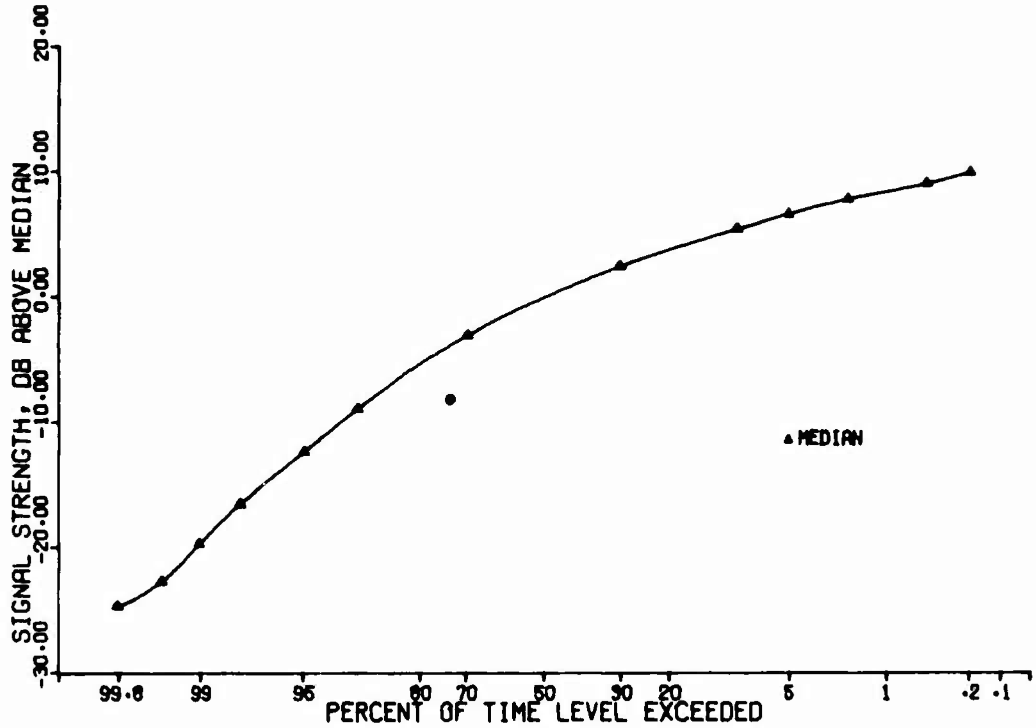


SIGNAL AMPLITUDE DISTRIBUTION

POINT PETRE, SEPTEMBER, X-BAND

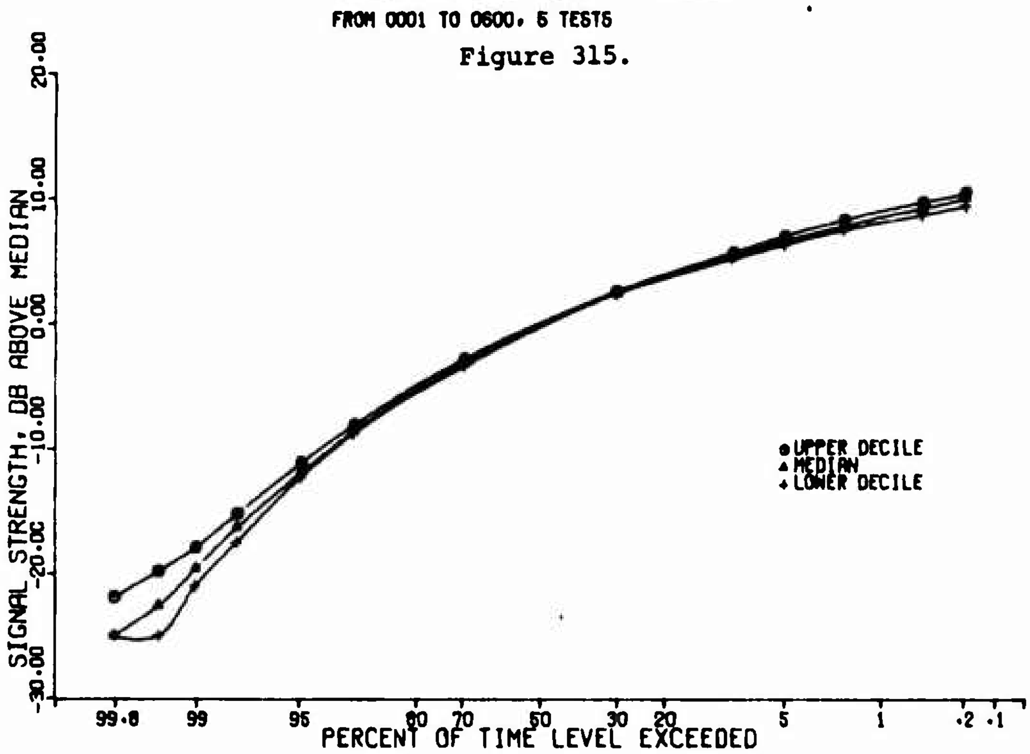
FROM 1801 TO 2400, 7 TESTS

Figure 314.



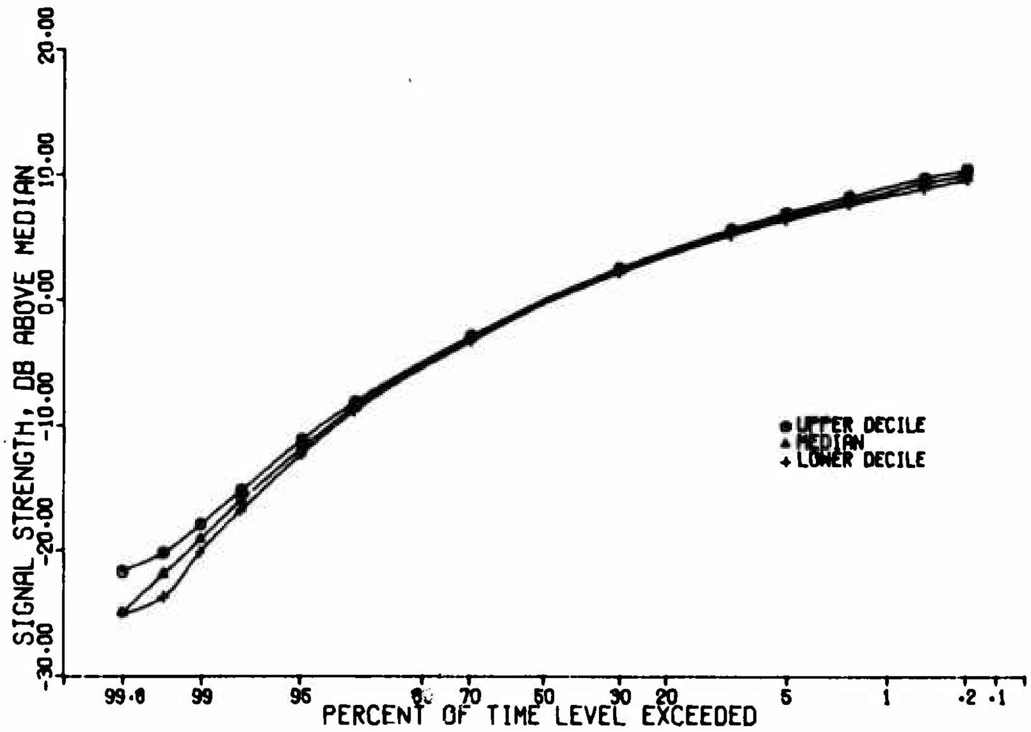
SIGNAL AMPLITUDE DISTRIBUTION
ONTARIO CENTER, OCTOBER, C-BAND
FROM 0001 TO 0600, 5 TESTS

Figure 315.



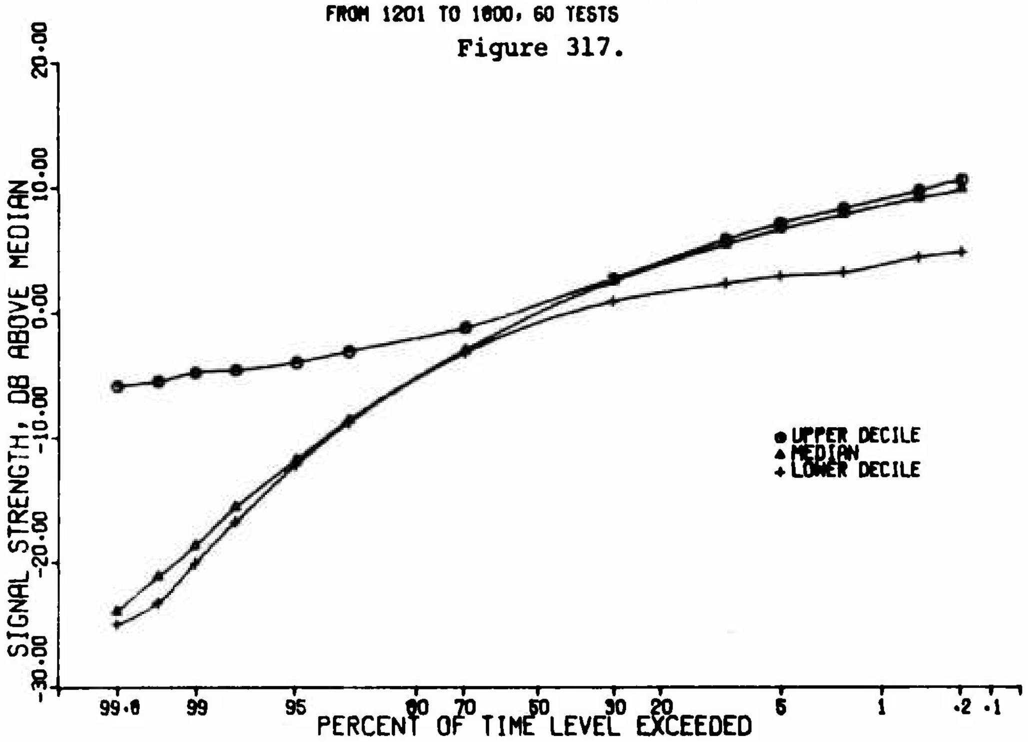
SIGNAL AMPLITUDE DISTRIBUTION
ONTARIO CENTER, OCTOBER, C-BAND
FROM 0601 TO 1200, 36 TESTS

Figure 316.



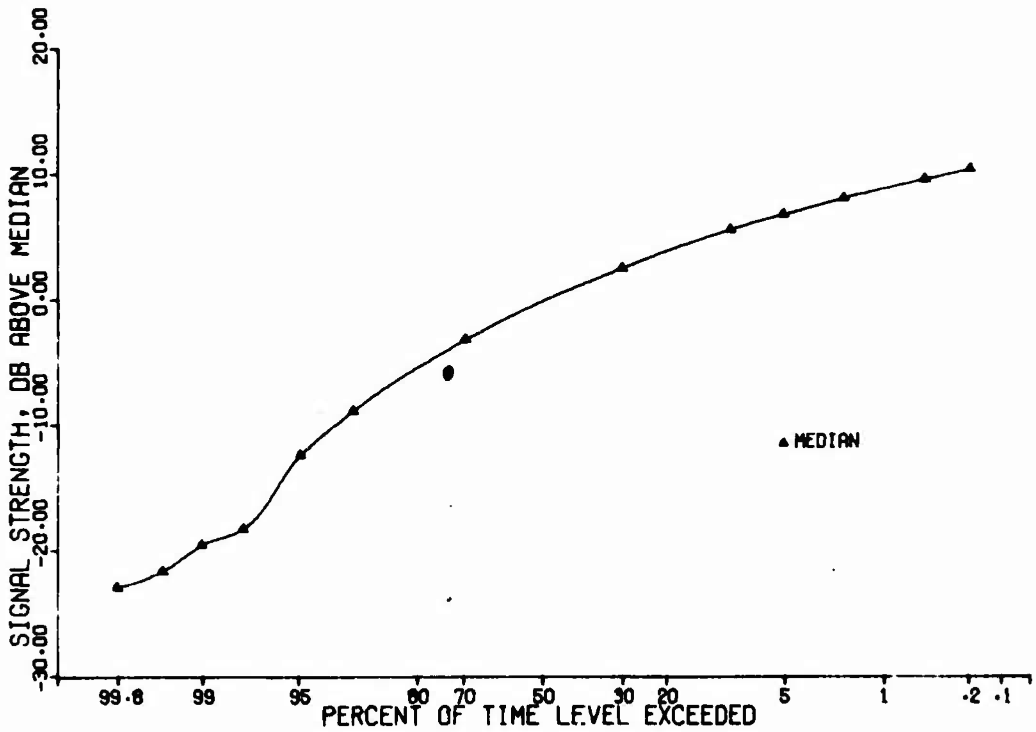
SIGNAL AMPLITUDE DISTRIBUTION
ONTARIO CENTER, OCTOBER, C-BAND
FROM 1201 TO 1800, 60 TESTS

Figure 317.



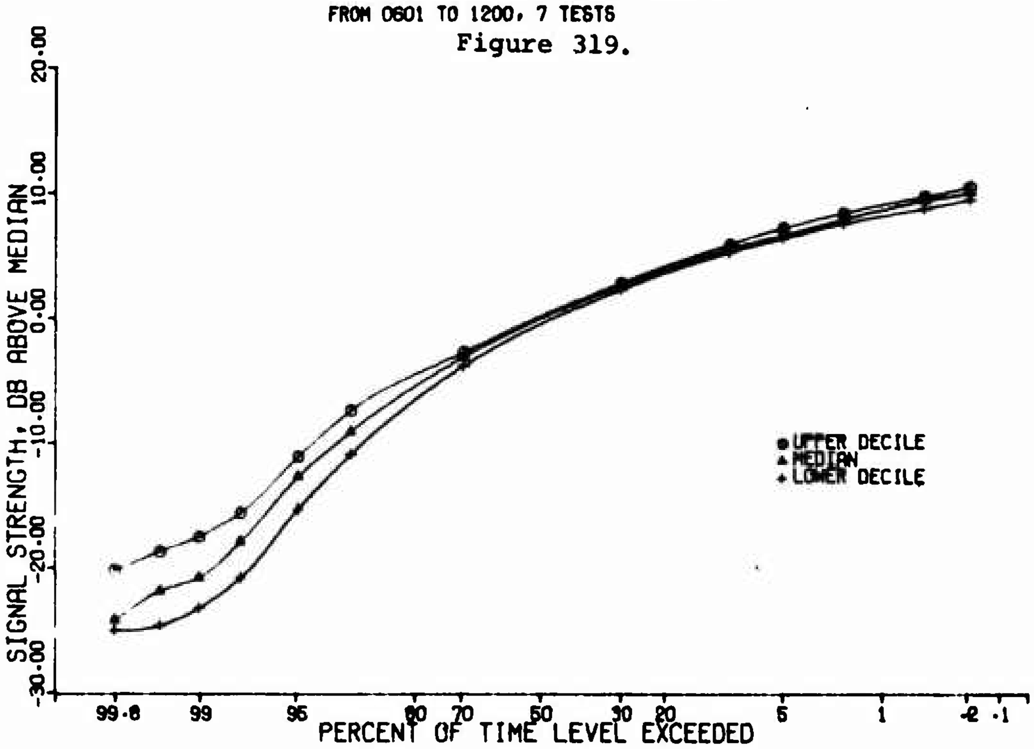
SIGNAL AMPLITUDE DISTRIBUTION
ONTARIO CENTER, OCTOBER, C-BAND
FROM 1801 TO 2400, 26 TESTS

Figure 318.



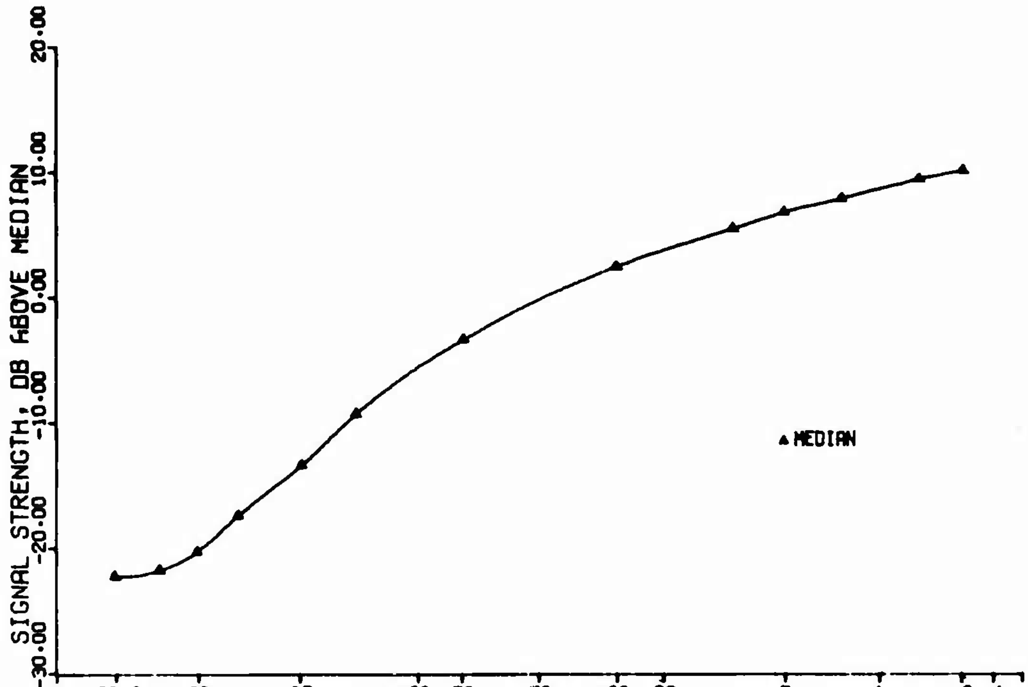
SIGNAL AMPLITUDE DISTRIBUTION
WHITFORD FIELD, NOVEMBER, C-BAND
FROM 0601 TO 1200, 7 TESTS

Figure 319.



SIGNAL AMPLITUDE DISTRIBUTION
WHITFORD FIELD, NOVEMBER, C-BAND
FROM 1201 TO 1800, 29 TESTS

Figure 320.



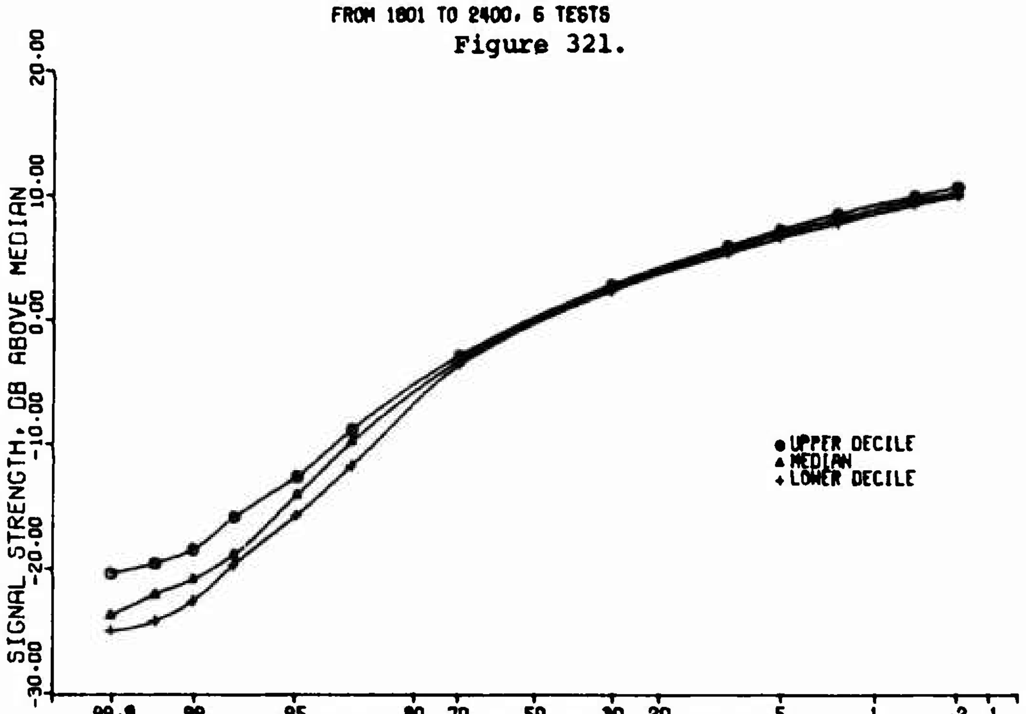
PERCENT OF TIME LEVEL EXCEEDED

SIGNAL AMPLITUDE DISTRIBUTION

WHITFORD FIELD, NOVEMBER, C-BAND

FROM 1801 TO 2400, 6 TESTS

Figure 321.



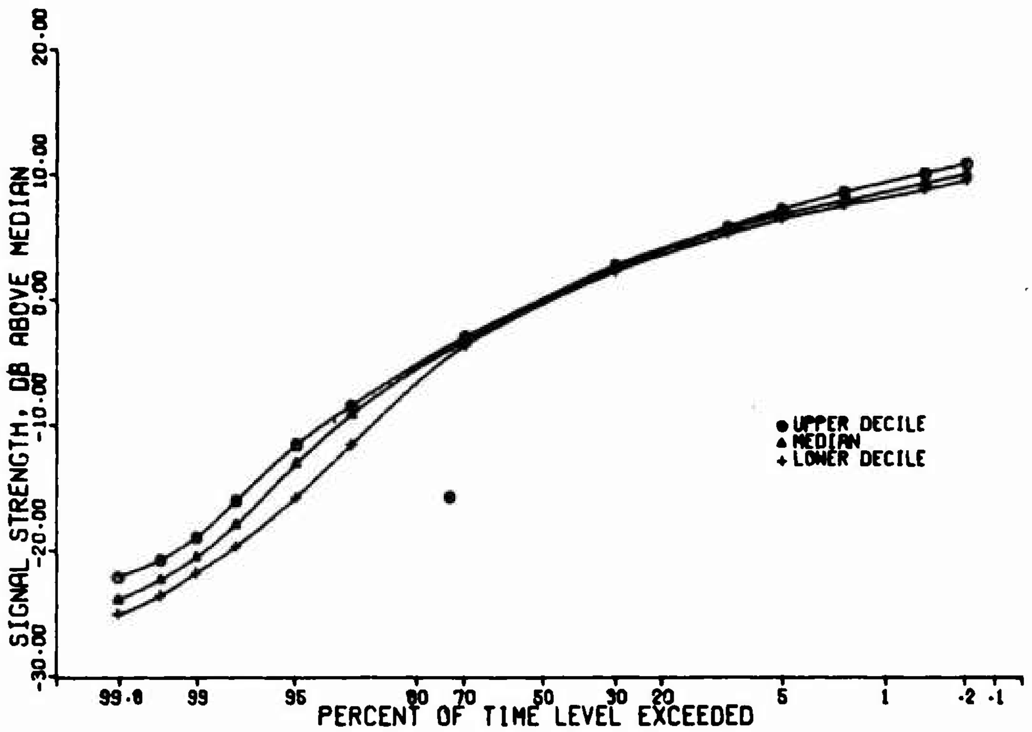
PERCENT OF TIME LEVEL EXCEEDED

SIGNAL AMPLITUDE DISTRIBUTION

PORT BYRON, FEBRUARY, C-BAND

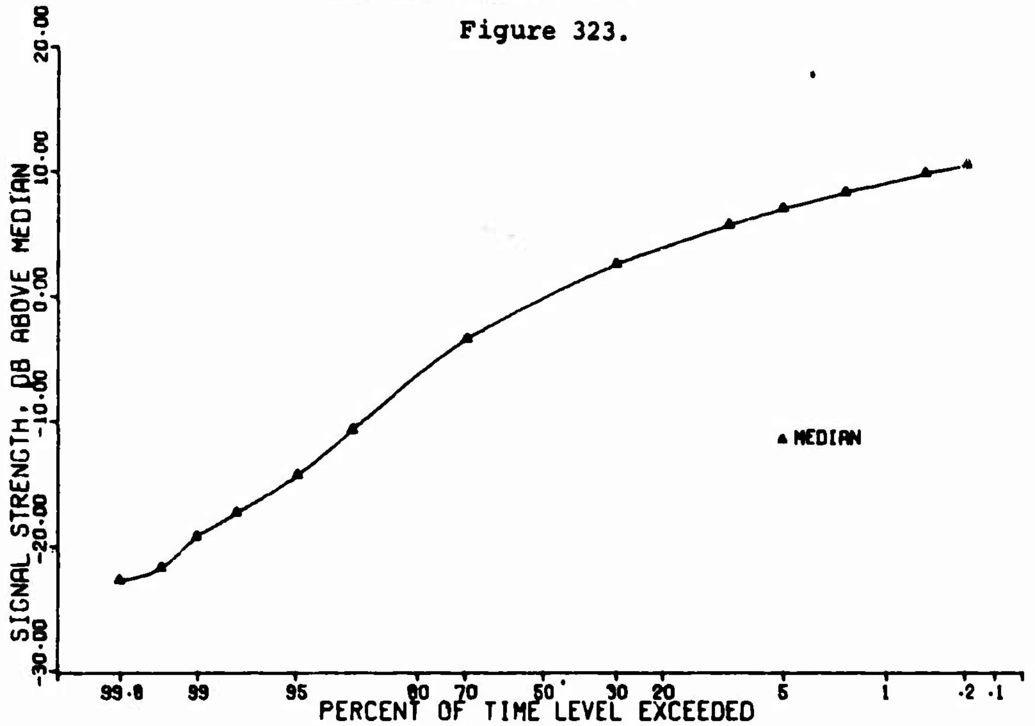
FROM 0601 TO 1200, 22 TESTS

Figure 322.



SIGNAL AMPLITUDE DISTRIBUTION
PORT BYRON, FEBRUARY, C-BAND
FROM 1201 TO 1800, 24 TESTS

Figure 323.



SIGNAL AMPLITUDE DISTRIBUTION
PORT BYRON, FEBRUARY, C-BAND
FROM 1801 TO 2400, 3 TESTS

Figure 324.

F. SUMMARY BAR GRAPHS

Figures 325 through 360 are summary bar graphs for X- and C-band data from the four sites. Points read from the distribution plots are presented in this form to permit comparison of the range of values during different test conditions. Where sufficient data exists, the upper and lower deciles are plotted in addition to the median. Summary bar graphs are not shown for fade depth or duration or signal amplitude for Port Byron X-band due to lack of sufficient fade margin.

With the exception of the fade duration summaries, the figures give values for the upper and lower deciles as well as the median. In cases of insufficient data only the medians are shown. Irrespective of the type of chart, the median is to be interpreted as the median value for all included tests for the particular parameter displayed. The deciles are contributed by the averages in the upper and lower 10 percent of all included tests which individually were in the upper or lower 10 percent of the parameter displayed.

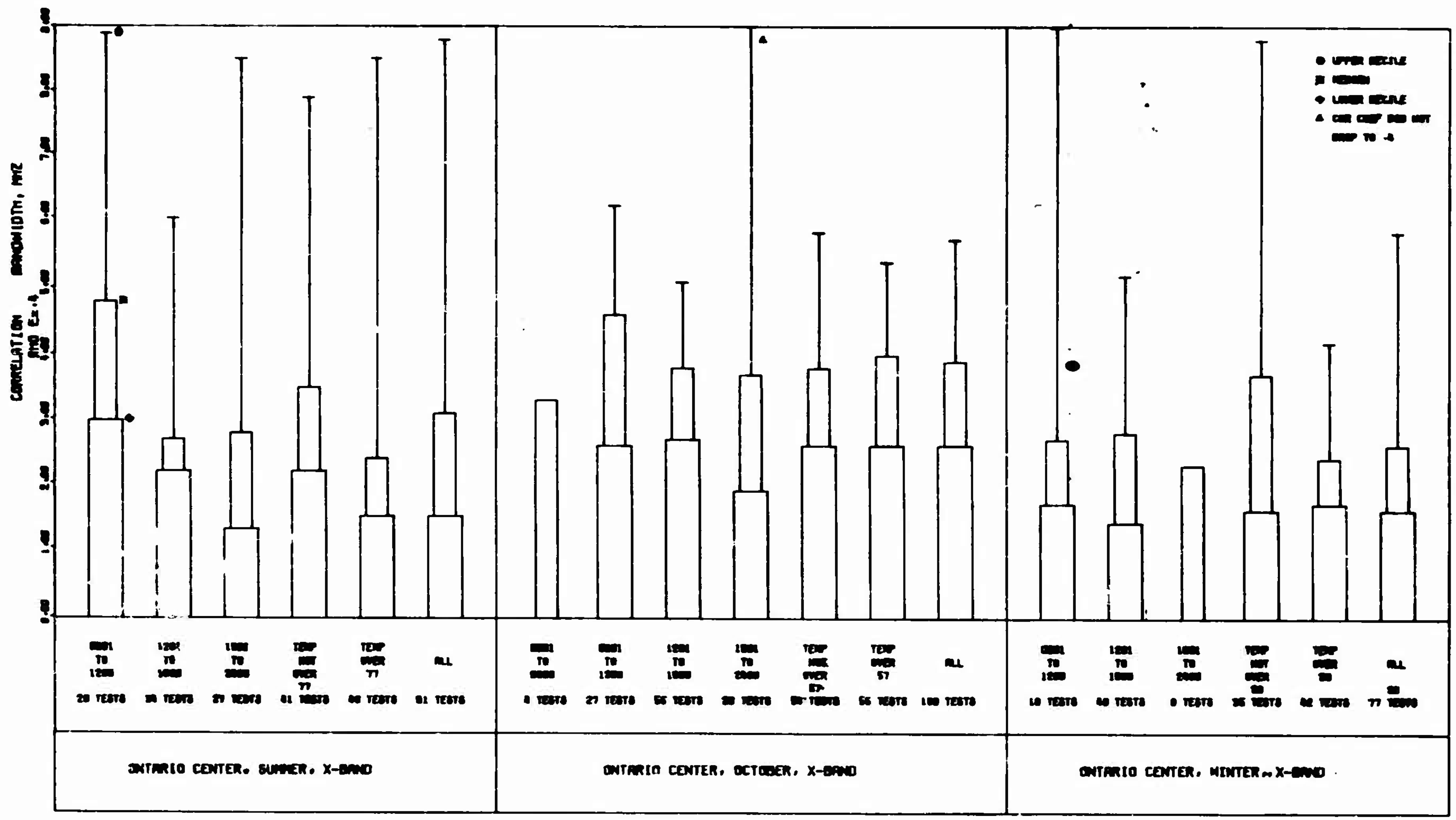
Figures 325 through 331 give the summaries of the observed frequency correlation coefficients. The ordinate gives the correlation bandwidth, defined by $\rho_e = 0.4$, in MHz. As an example, in Figure 325 the median correlation bandwidth at Ontario Center in the summer for all X-band data is seen to be approximately 3 MHz. That is, each of the 81 tests included is characterized by a value of ρ_e and the median of these is 3 MHz. The average of the 8 tests (10%) having the highest individual values of ρ_e is the upper decile value, here about 8.8 MHz. Likewise, the lower decile is about 1.5 MHz.

Figures 332 through 339 give the fade rate summaries. The ordinate gives the observed median fade rate in Hz., i.e., the 50% level. The plotted medians are actually medians of medians. For example, in Figure 332 for Ontario Center in the summer for all X-band data 50% of all fades were less than 2.4 Hz. Thus of the 88 tests comprising this summary each had a median fade rate. The median of these is 2.4 Hz. The upper and lower deciles are given by the averages in the upper and lower 10 percent of tests (each 9 tests) each individually had the highest and lowest median (50%) fade rates.

Figures 340 through 346 give the fade depth summaries. The ordinate is the median fade depth in dB, i.e., the 50% level. As for the fade rate summaries described above, the plotted medians are actually medians of medians and a similar interpretation to that given above applies to the deciles.

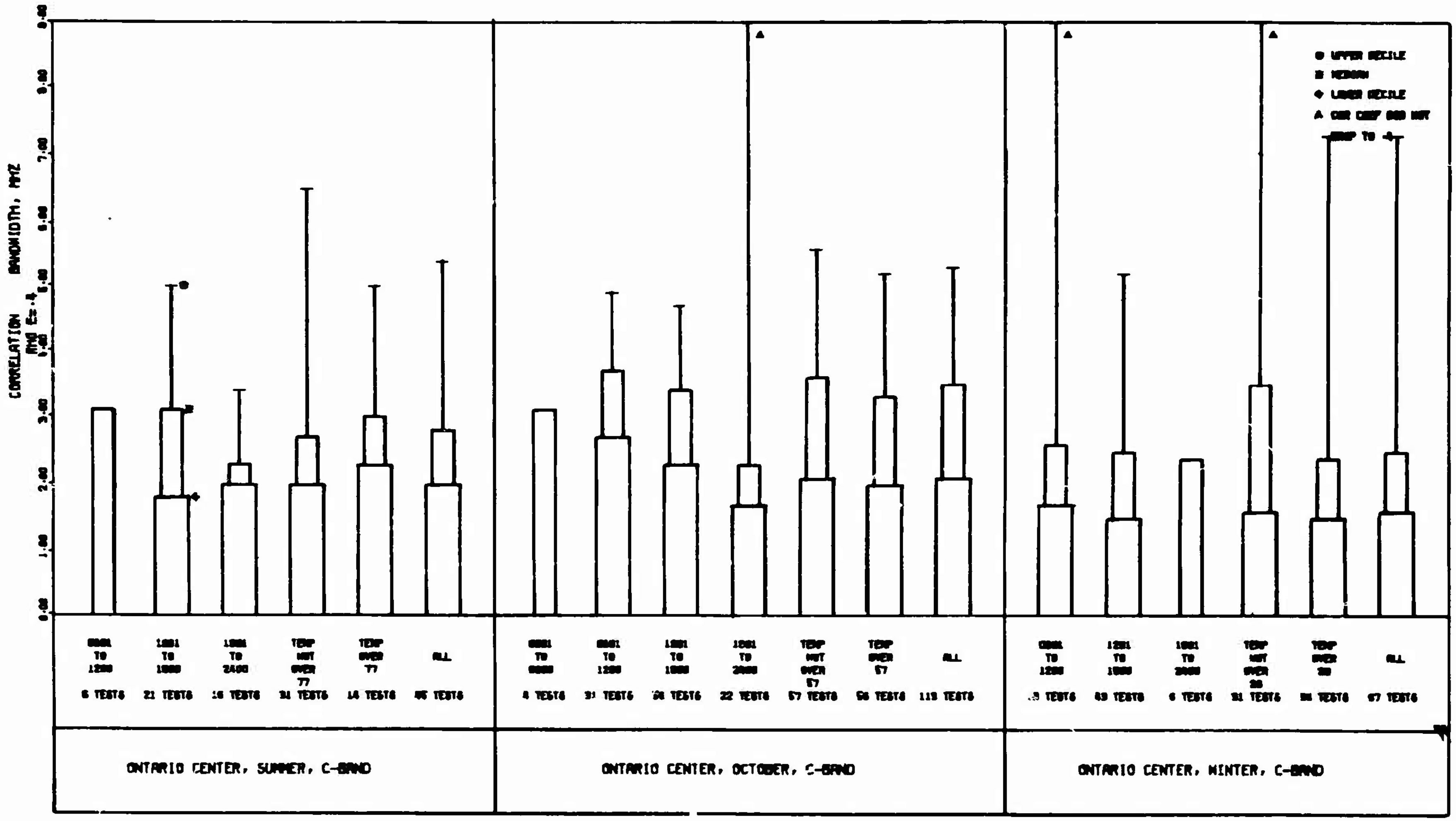
Figures 347 through 353 give the fade duration summaries. The ordinate is the median fade duration in milliseconds for all included tests and the three levels shown (0, 10, and 20 dB) are with respect to the individual median signal amplitude levels. As an example, again choosing the Ontario Center, summer, X-band, all data shown in Figure 347, the median fade duration below the individually measured median signal amplitudes is approximately 105 milliseconds. At levels 10 dB below the individually measured median signal amplitudes, the median fade duration is 35 milliseconds. Similarly, at the 20 dB level the median fade duration is about 15 milliseconds.

Finally, the signal amplitude summaries are shown in Figures 354 through 360. The ordinate gives the signal amplitude value, in dB below the individual test median signal amplitudes, which was exceeded 95 percent of the test time. The plotted upper decile indicates that the upper 10 percent of the tests included had signal amplitudes which varied from the individual median amplitudes by no more than the ordinate value for 95 percent of the time. Similarly, the 10 percent of included tests which displayed relatively deeper fading comprise the lower decile. The individual median signal amplitudes on an absolute scale naturally varied from test to test.



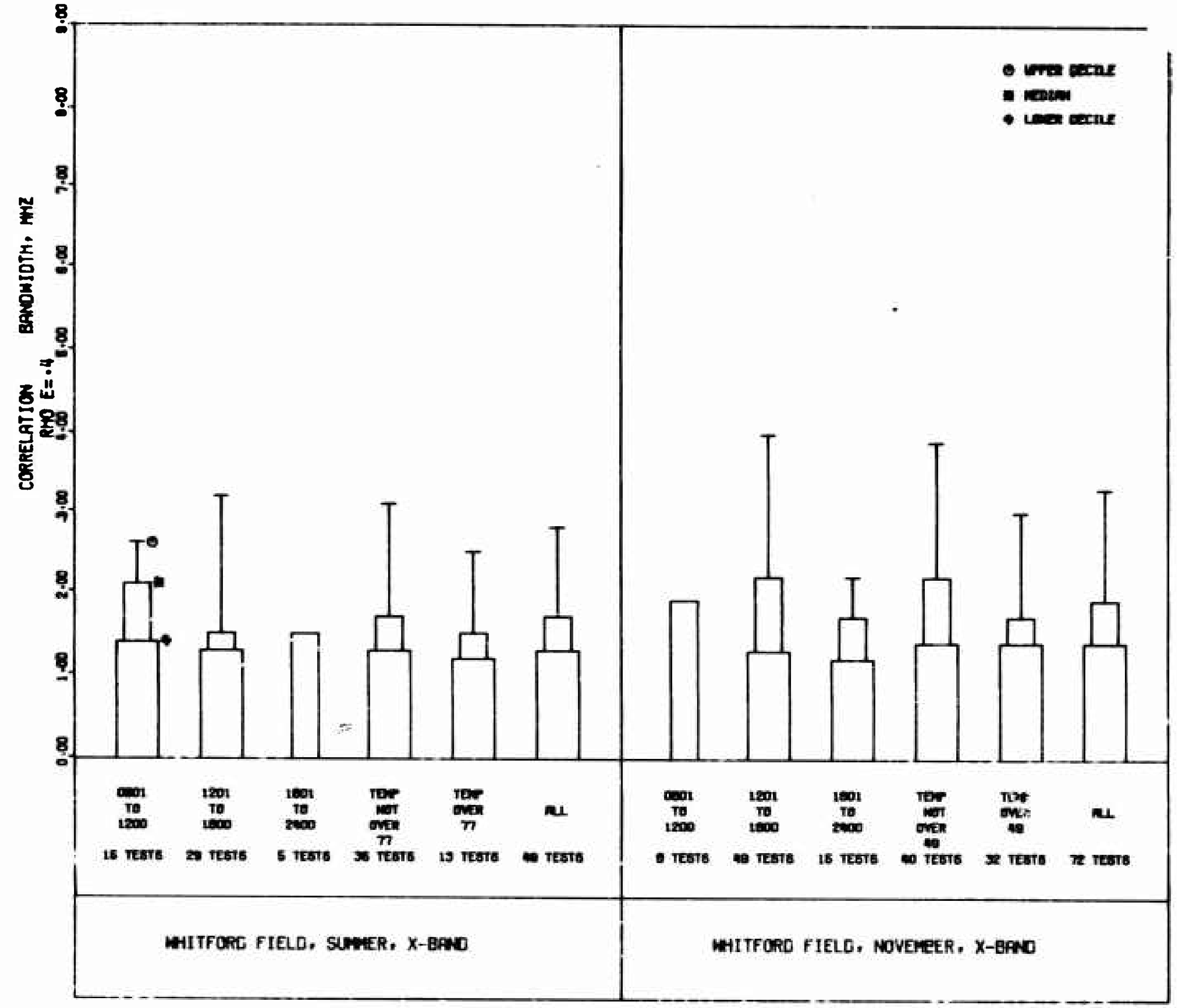
CORRELATION COEFFICIENT SUMMARY

Figure 325.



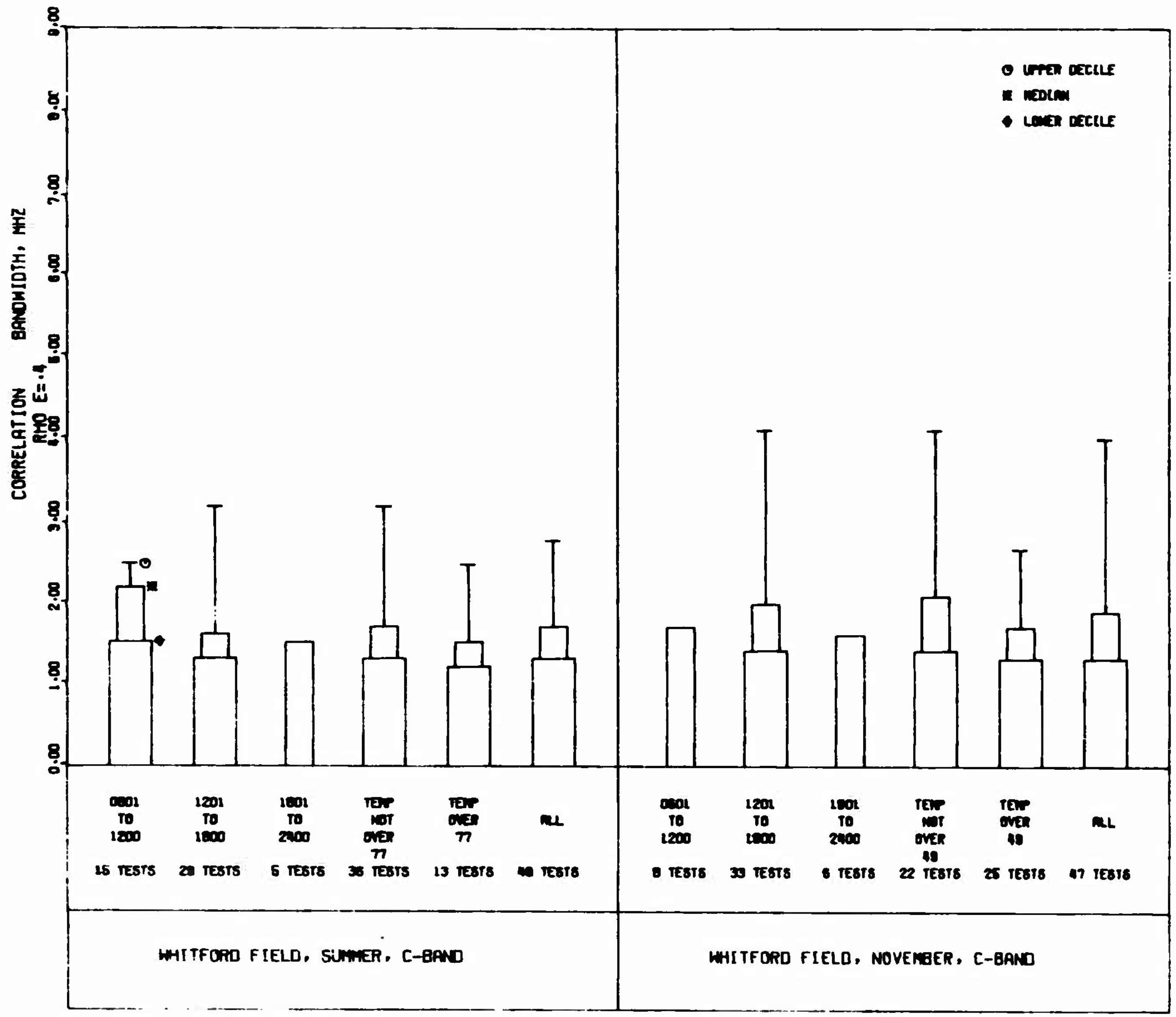
CORRELATION COEFFICIENT SUMMARY

Figure 326.

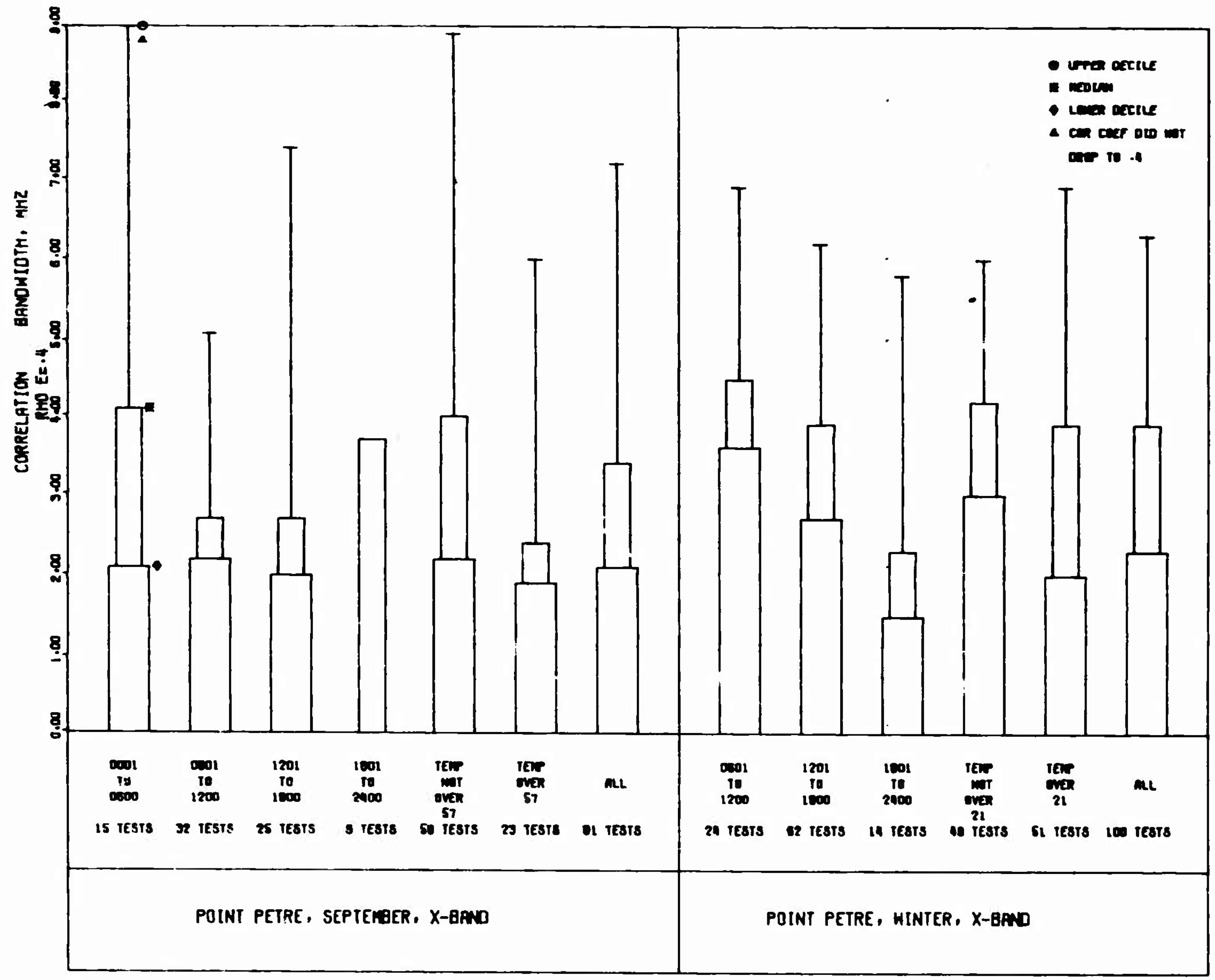


CORRELATION COEFFICIENT SUMMARY

Figure 327.

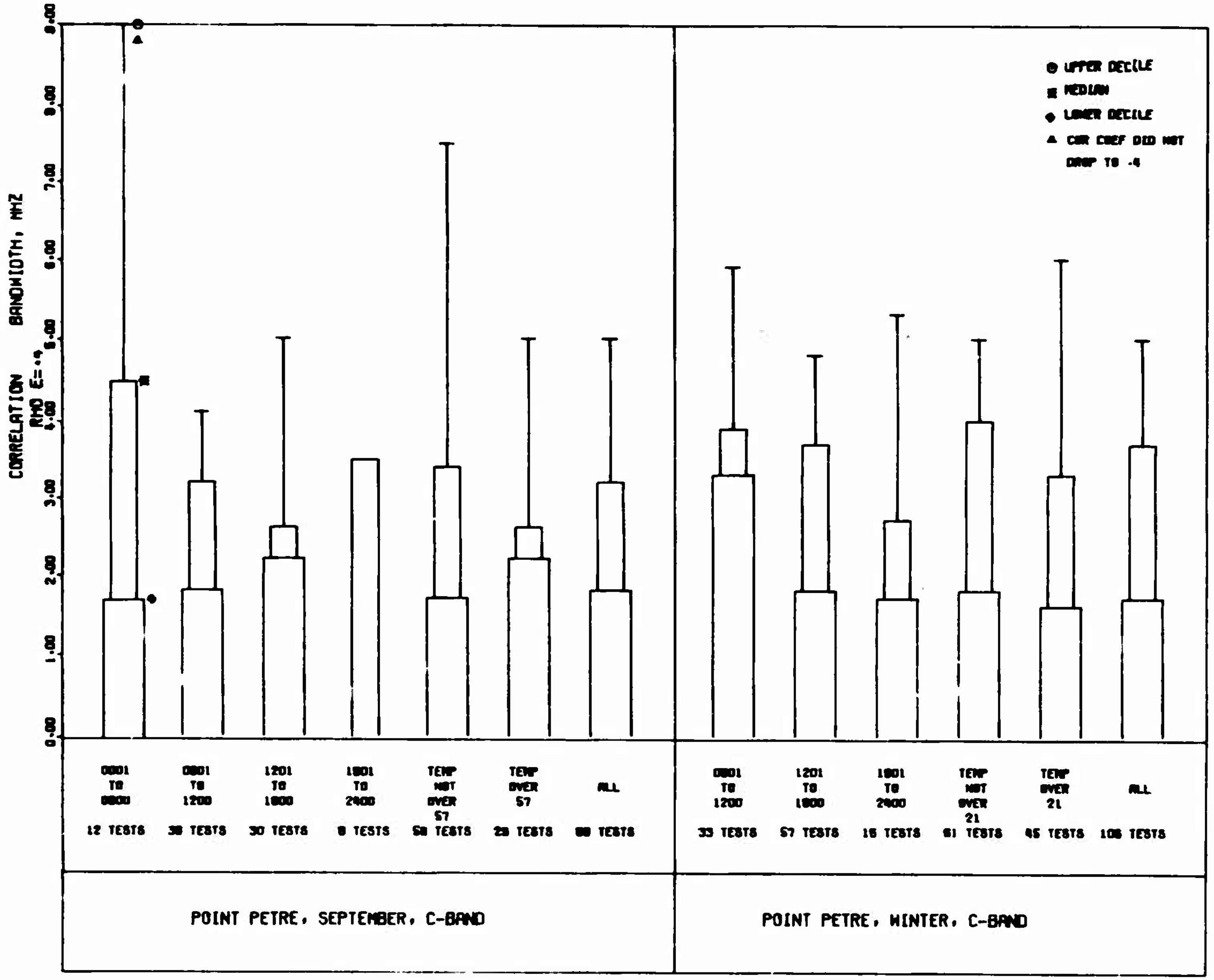


CORRELATION COEFFICIENT SUMMARY
Figure 328.



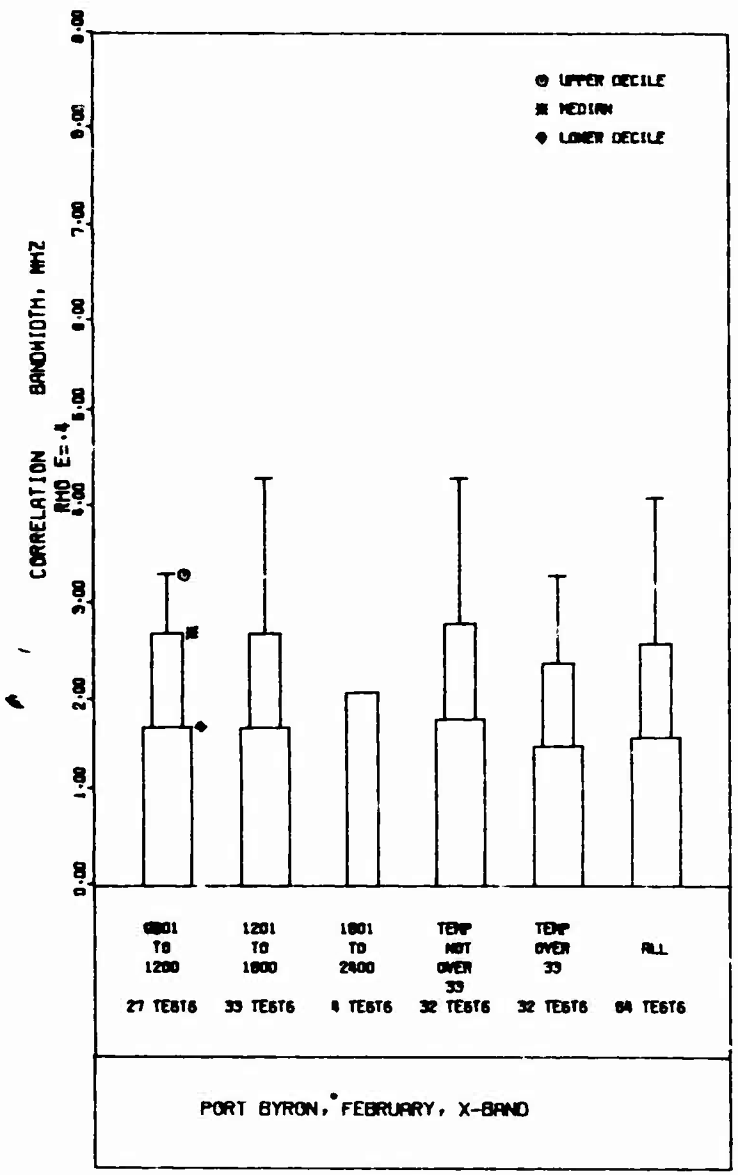
CORRELATION COEFFICIENT SUMMARY

Figure 329.

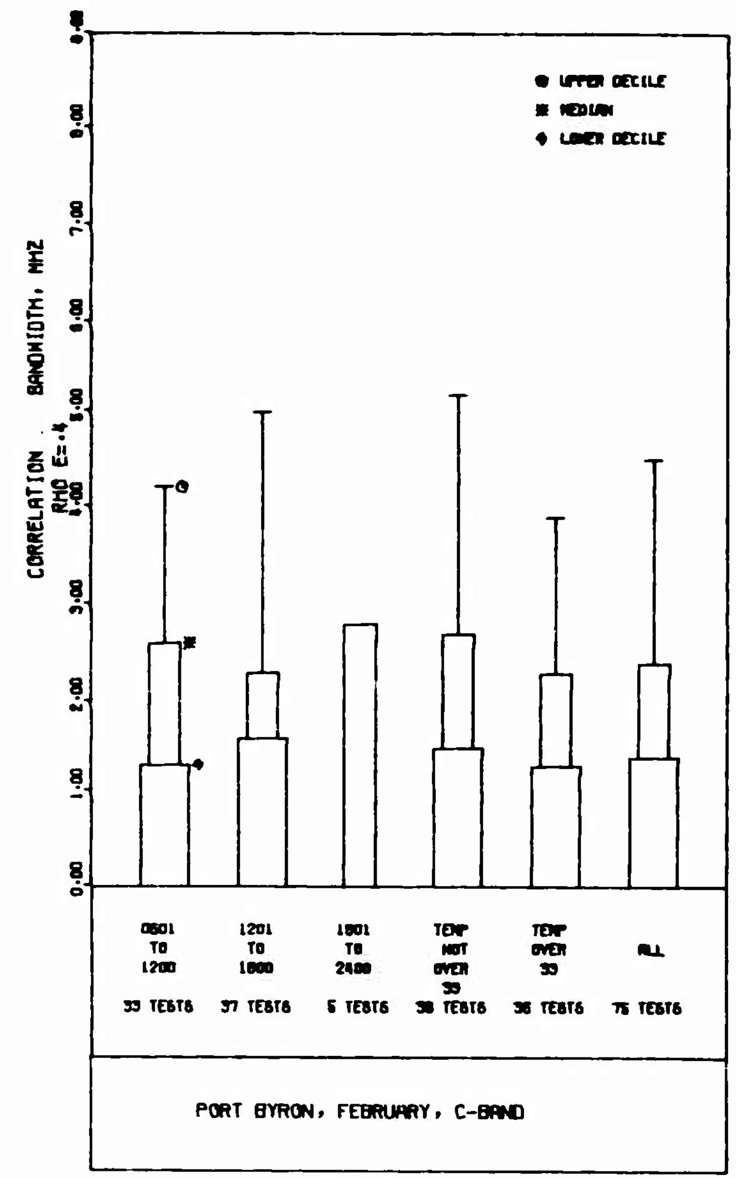


CORRELATION COEFFICIENT SUMMARY

Figure 330.

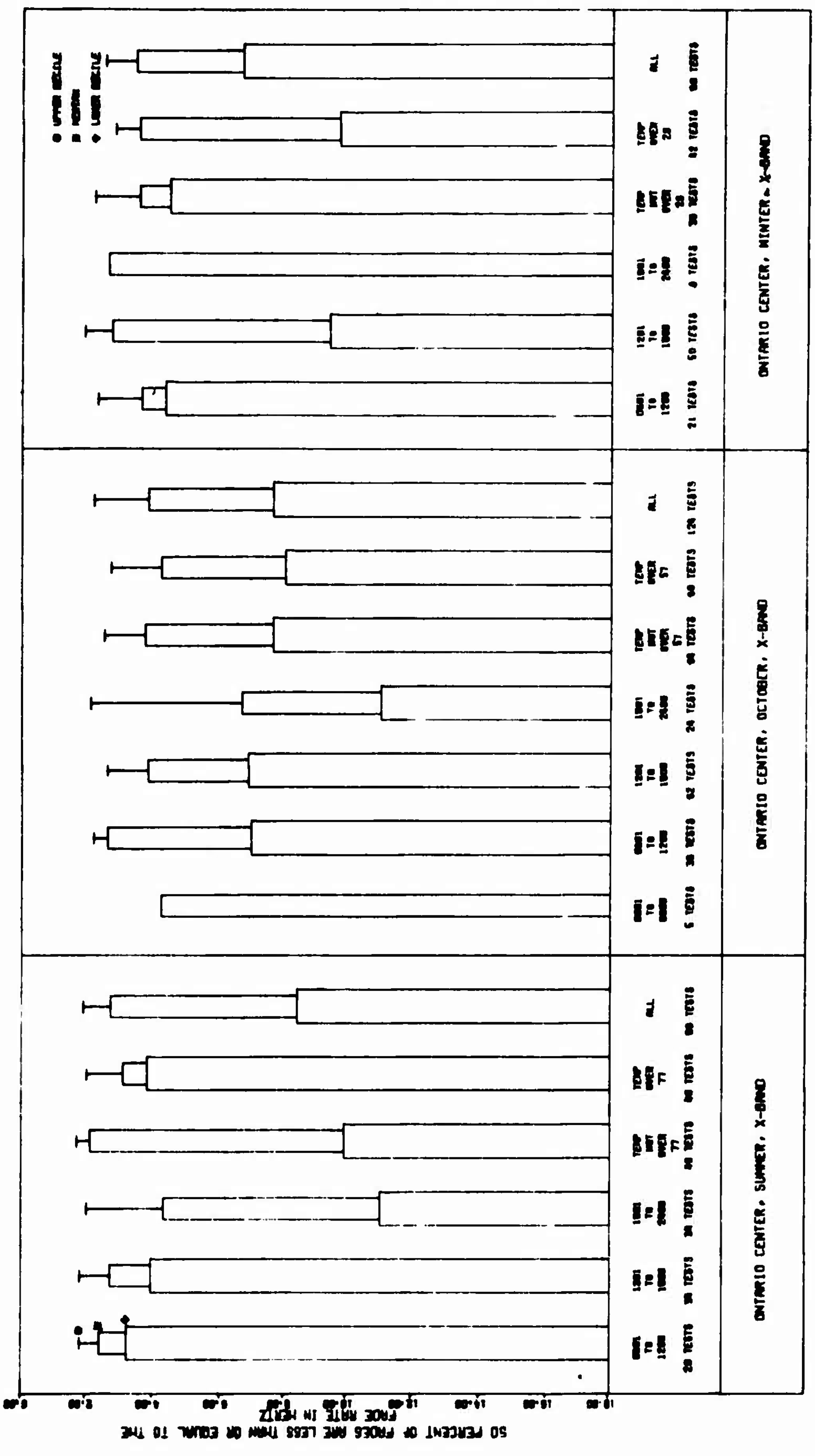


CORRELATION COEFFICIENT SUMMARY



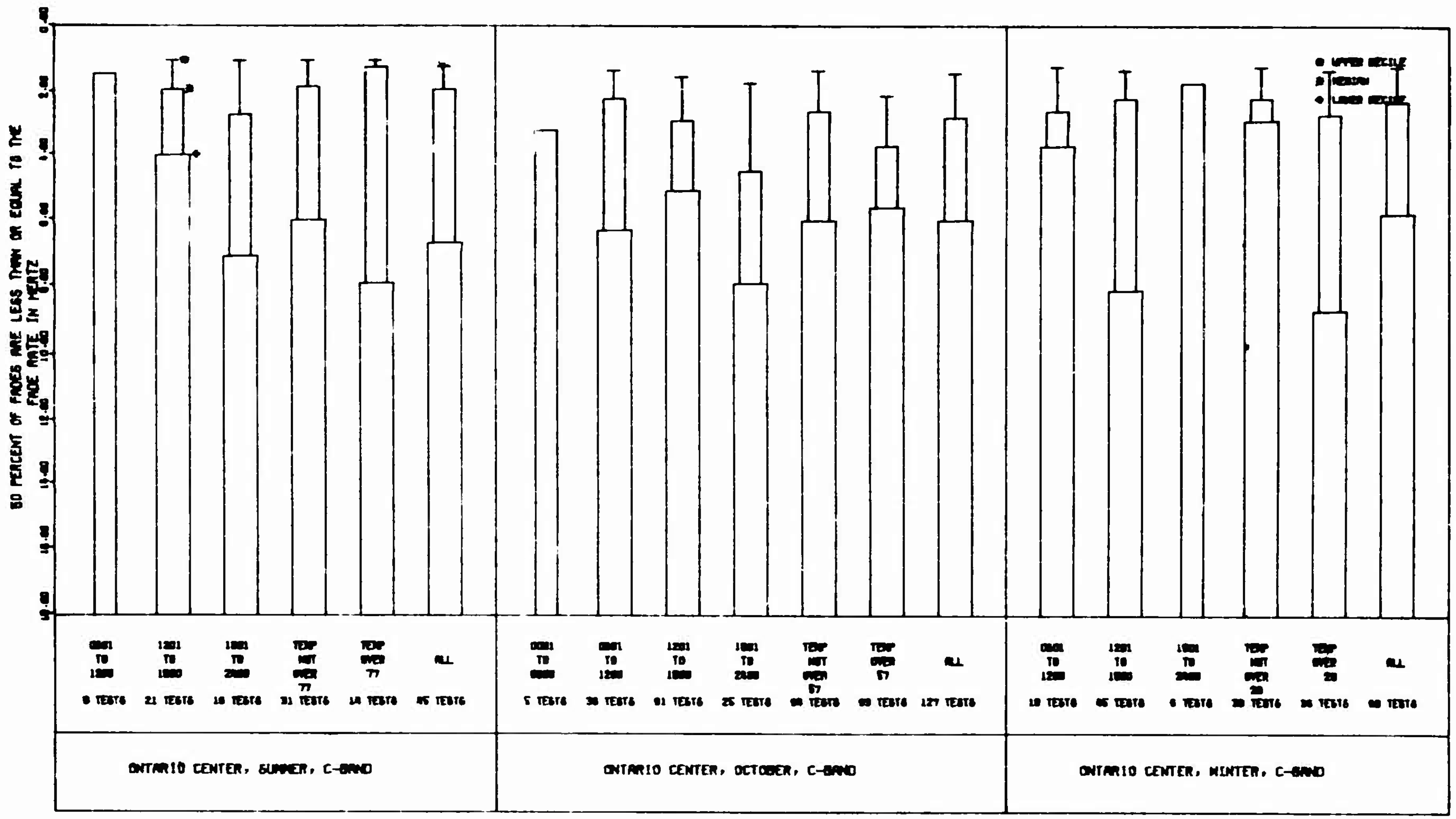
CORRELATION COEFFICIENT SUMMARY

Figure 331.



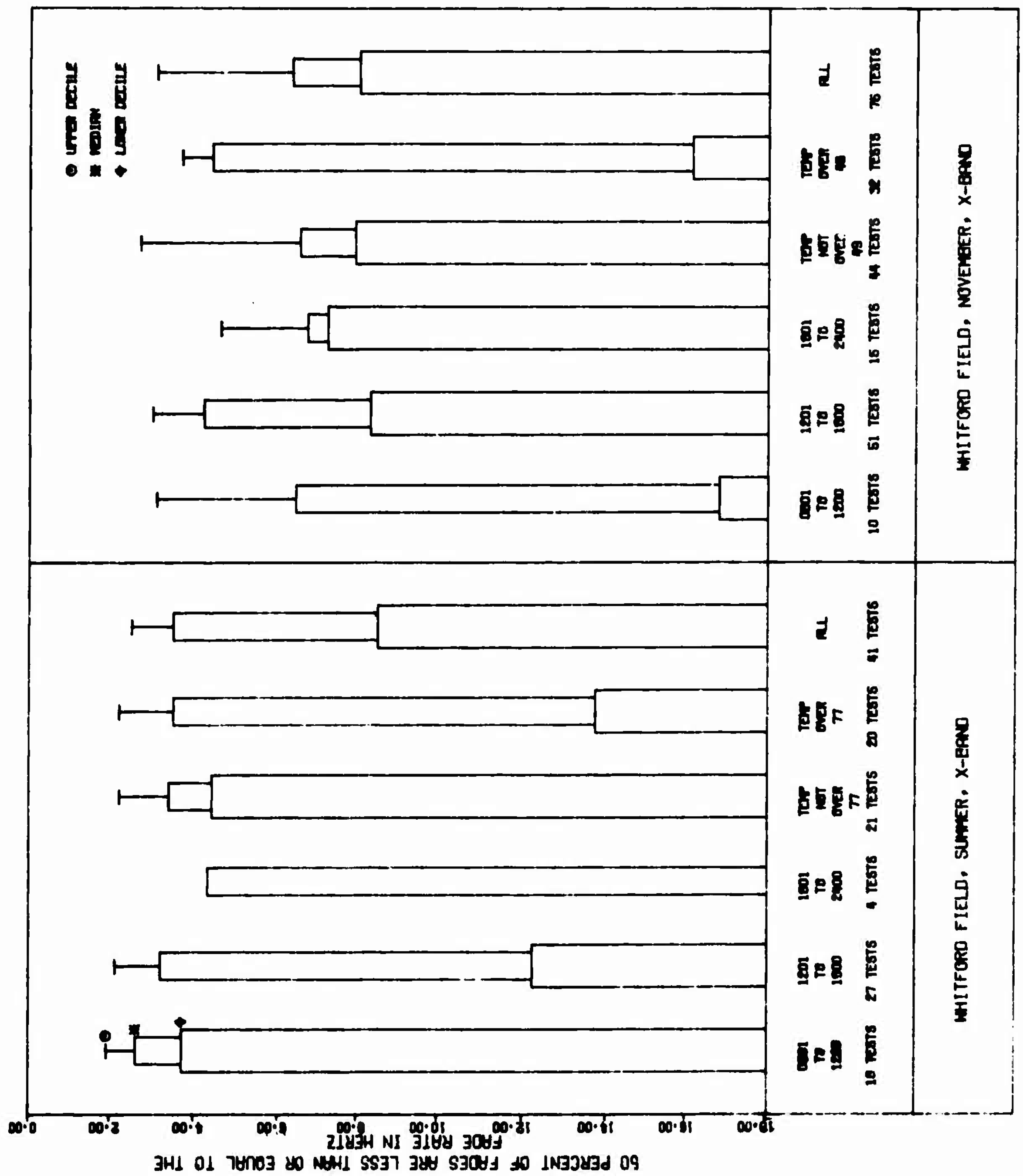
FADE RATE SUMMARY

Figure 332.

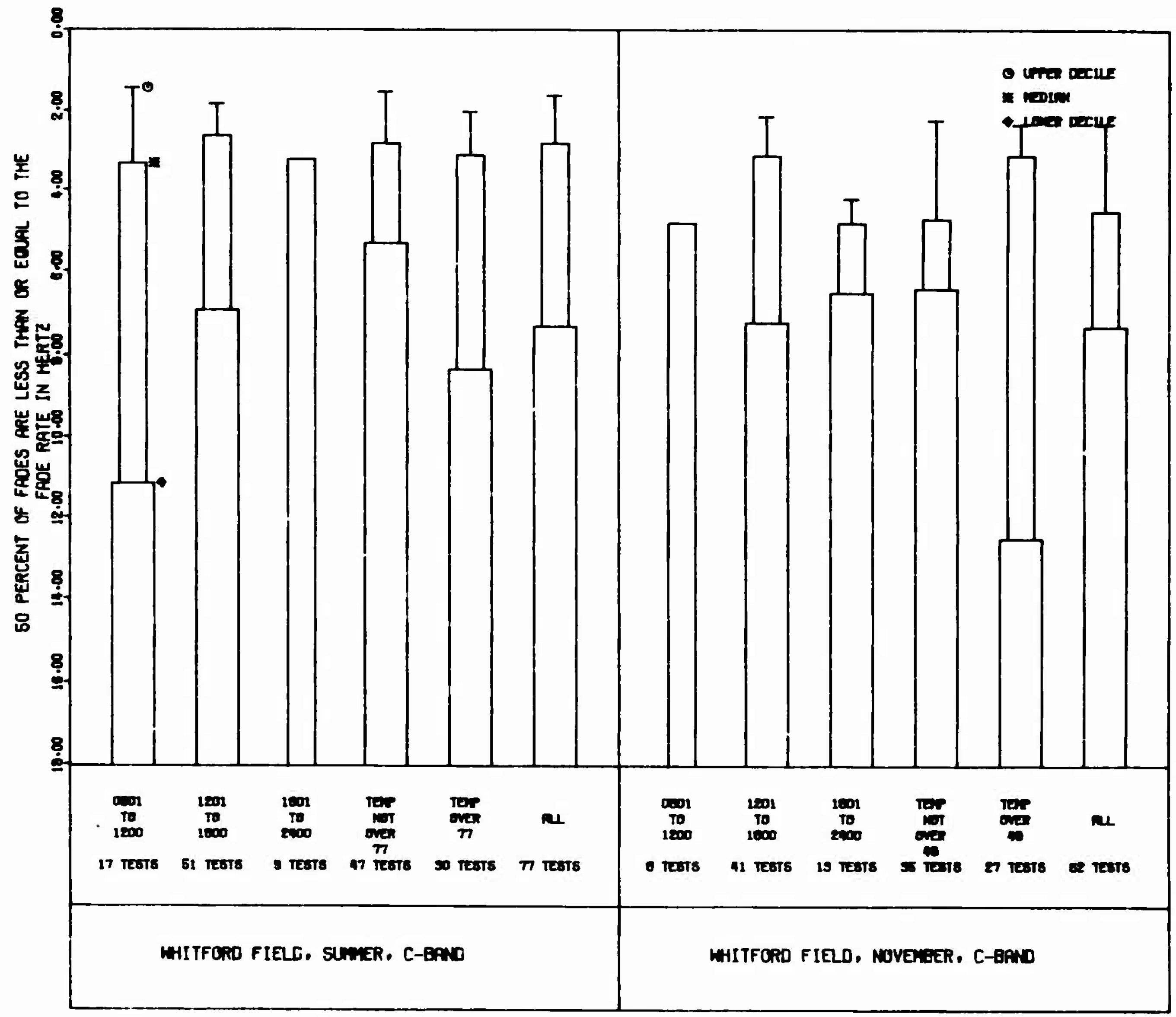


FADE RATE SUMMARY

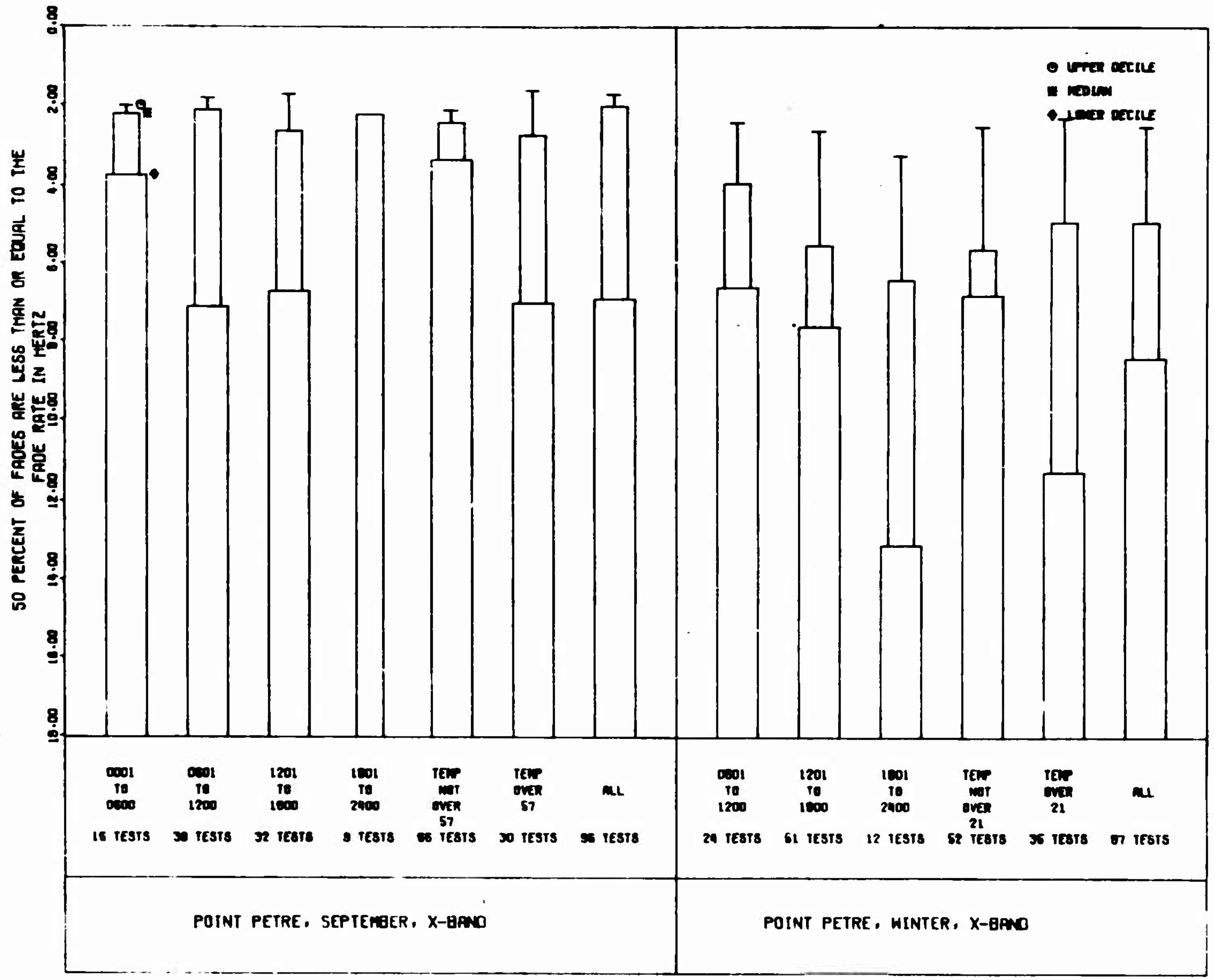
Figure 333.



FADE RATE SUMMARY
Figure 334.

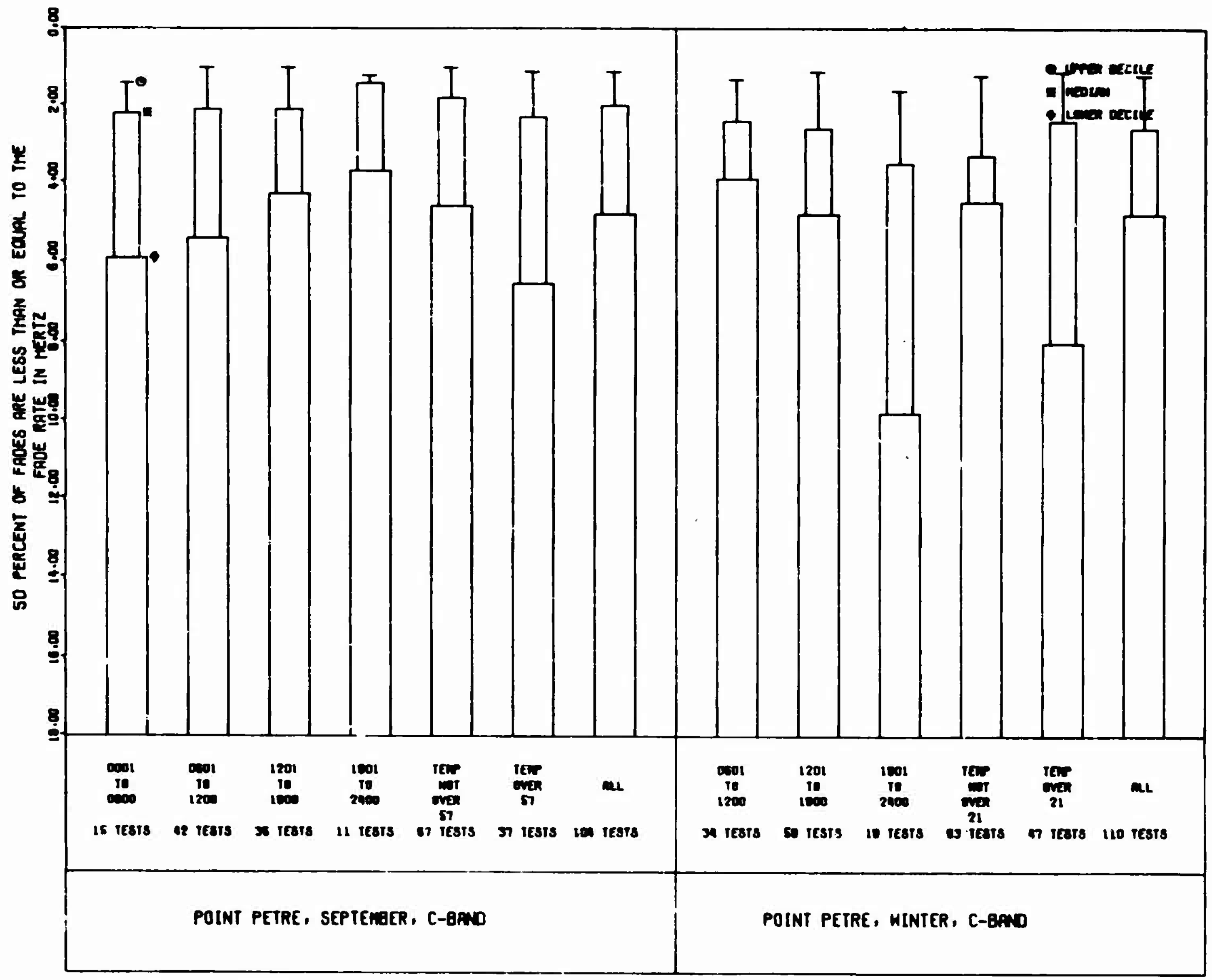


FADE RATE SUMMARY
Figure 335.



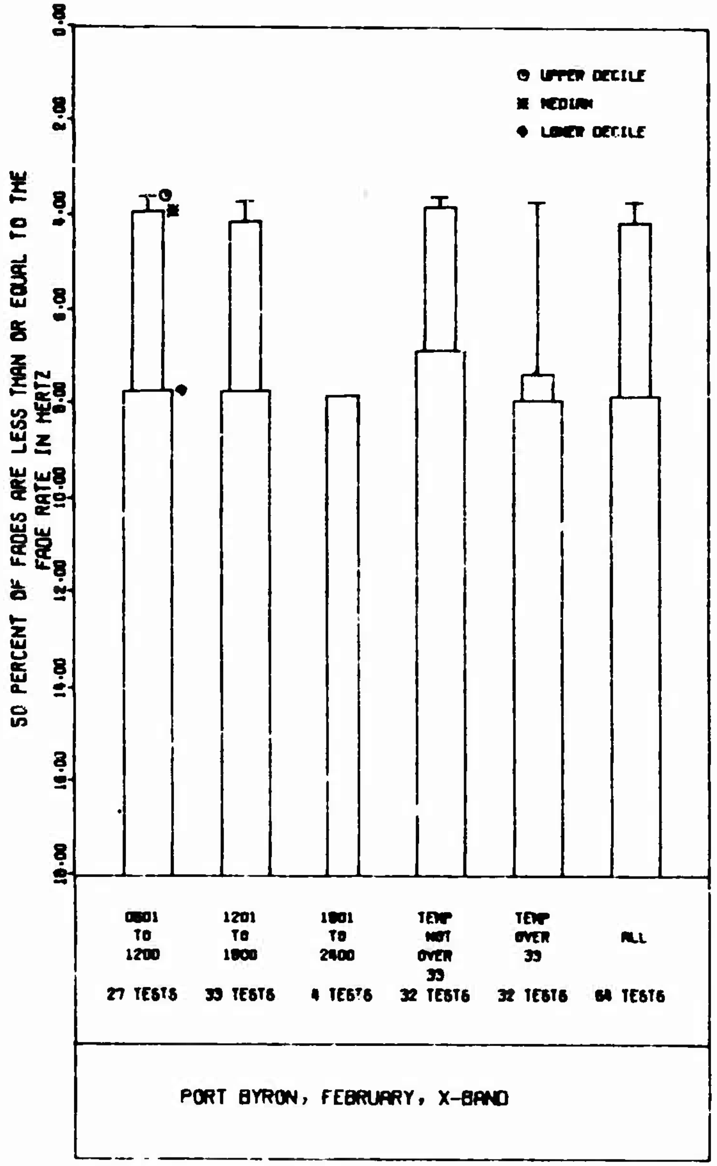
FADE RATE SUMMARY

Figure 336.

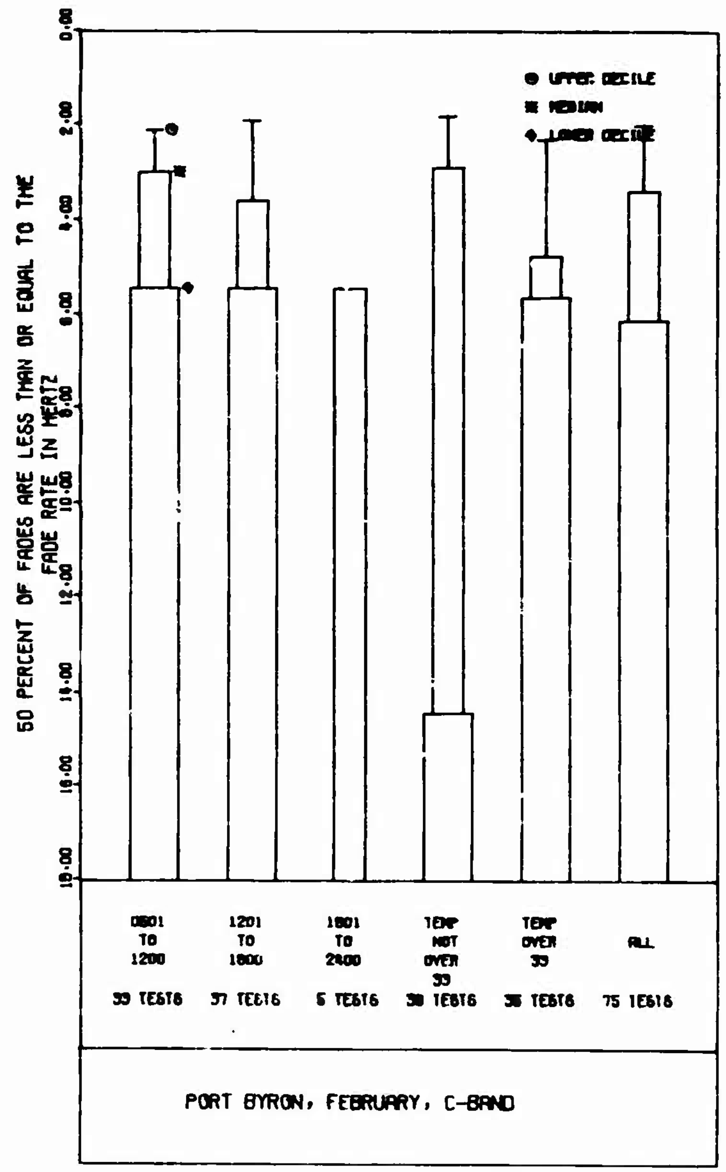


FADE RATE SUMMARY

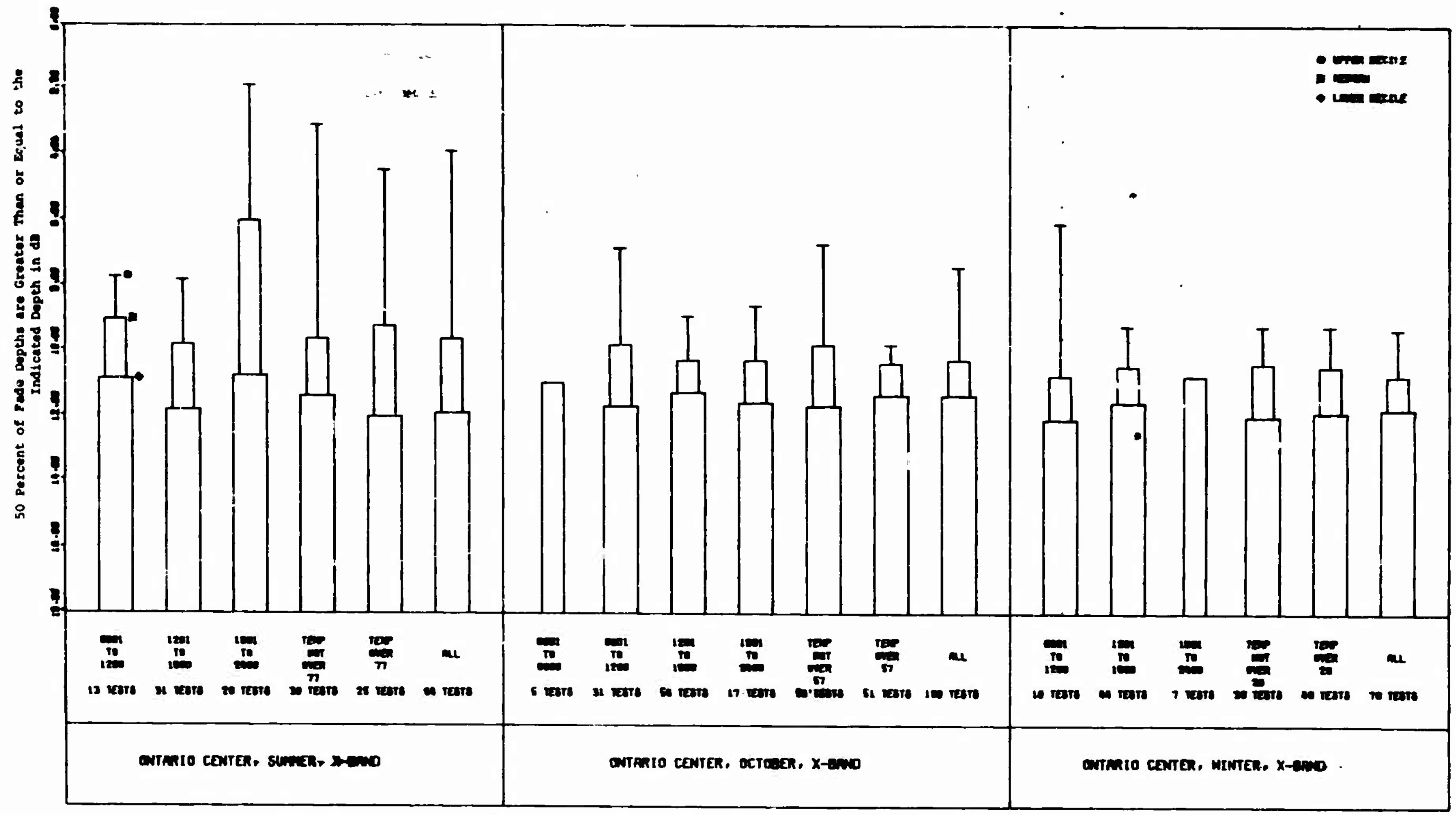
Figure 337.



FADE RATE SUMMARY
Figure 338.

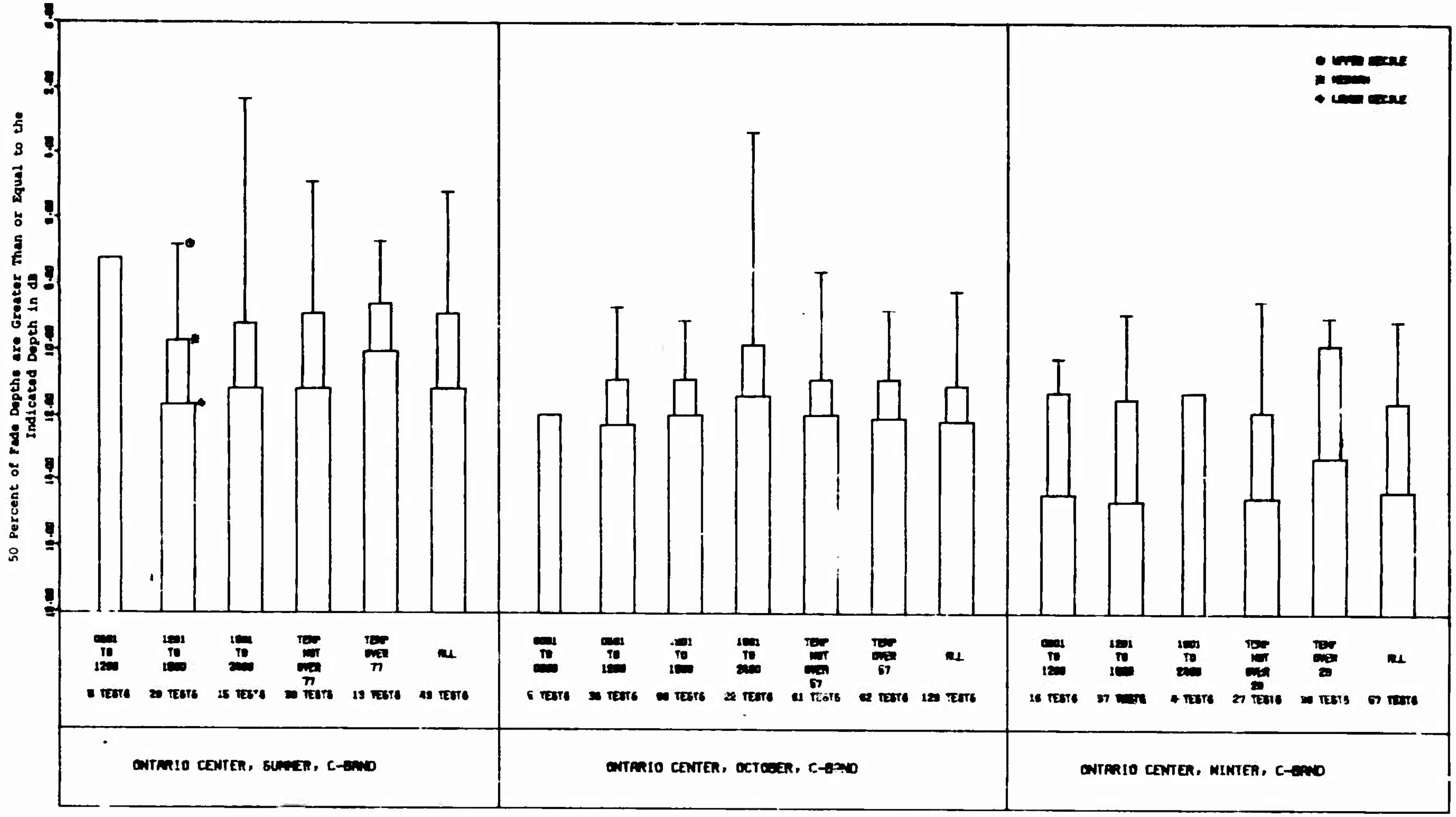


FADE RATE SUMMARY
Figure 339.



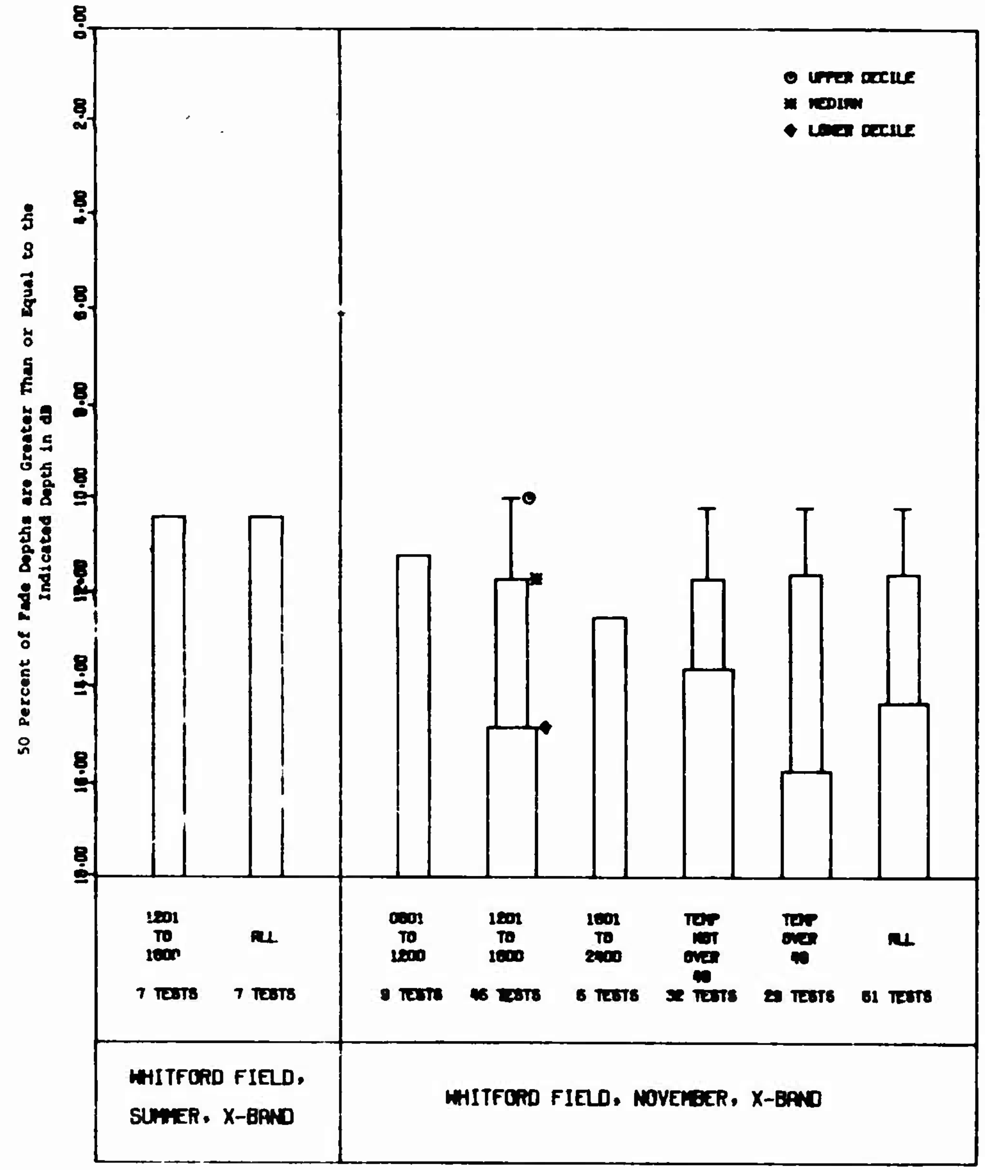
FADE DEPTH SUMMARY

Figure 340.



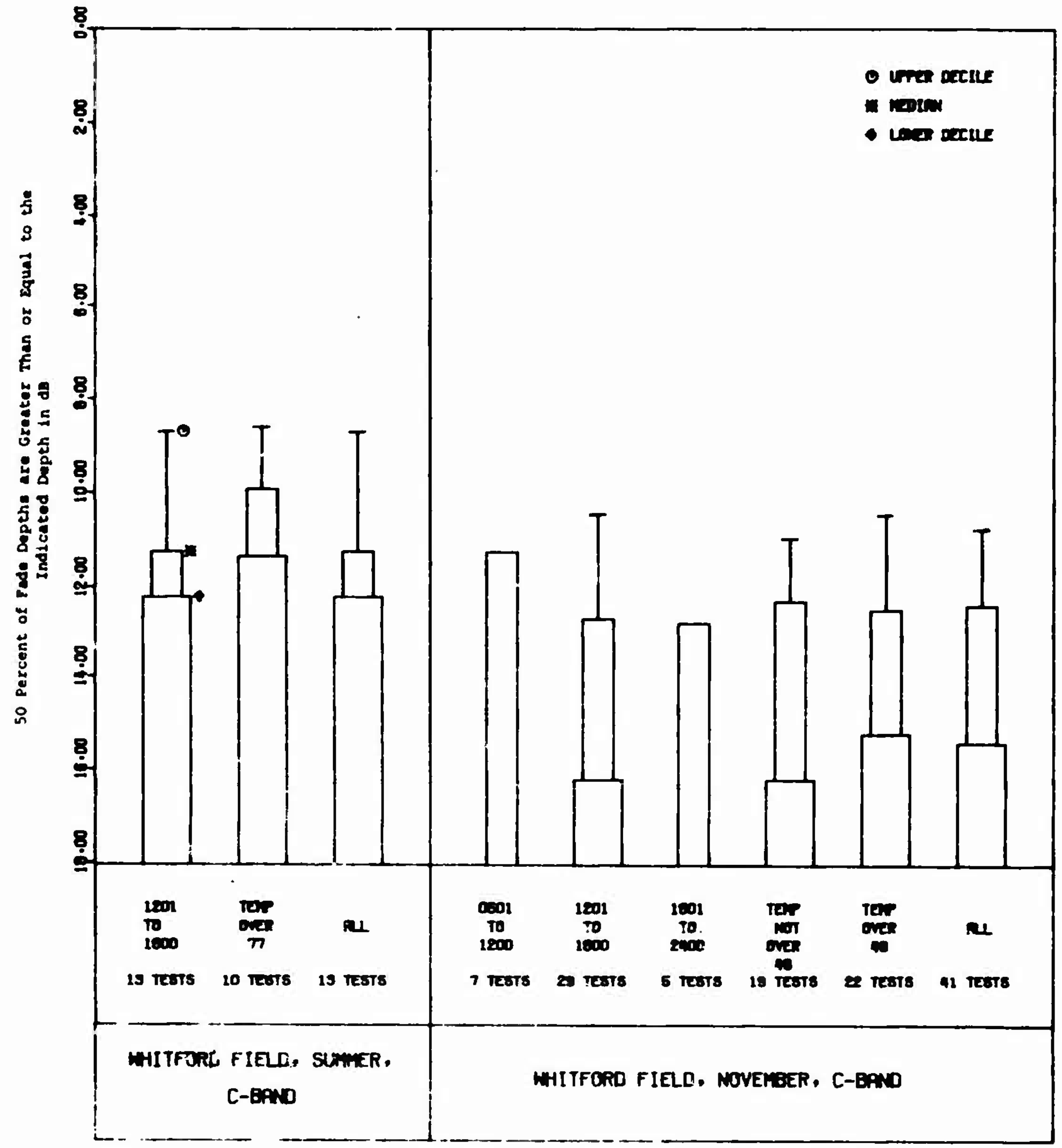
FADE DEPTH SUMMARY

Figure 341.



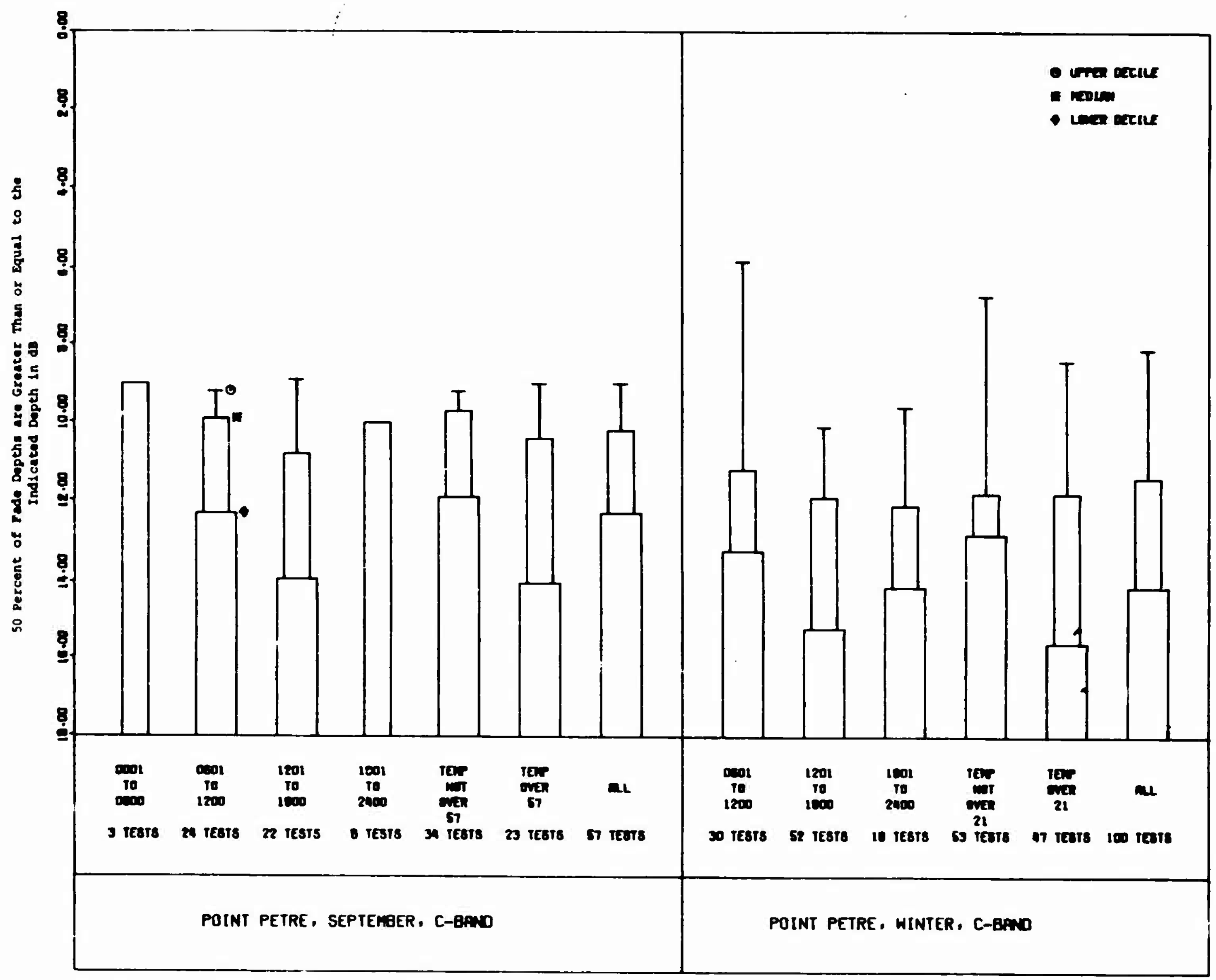
FADE DEPTH SUMMARY

Figure 342.

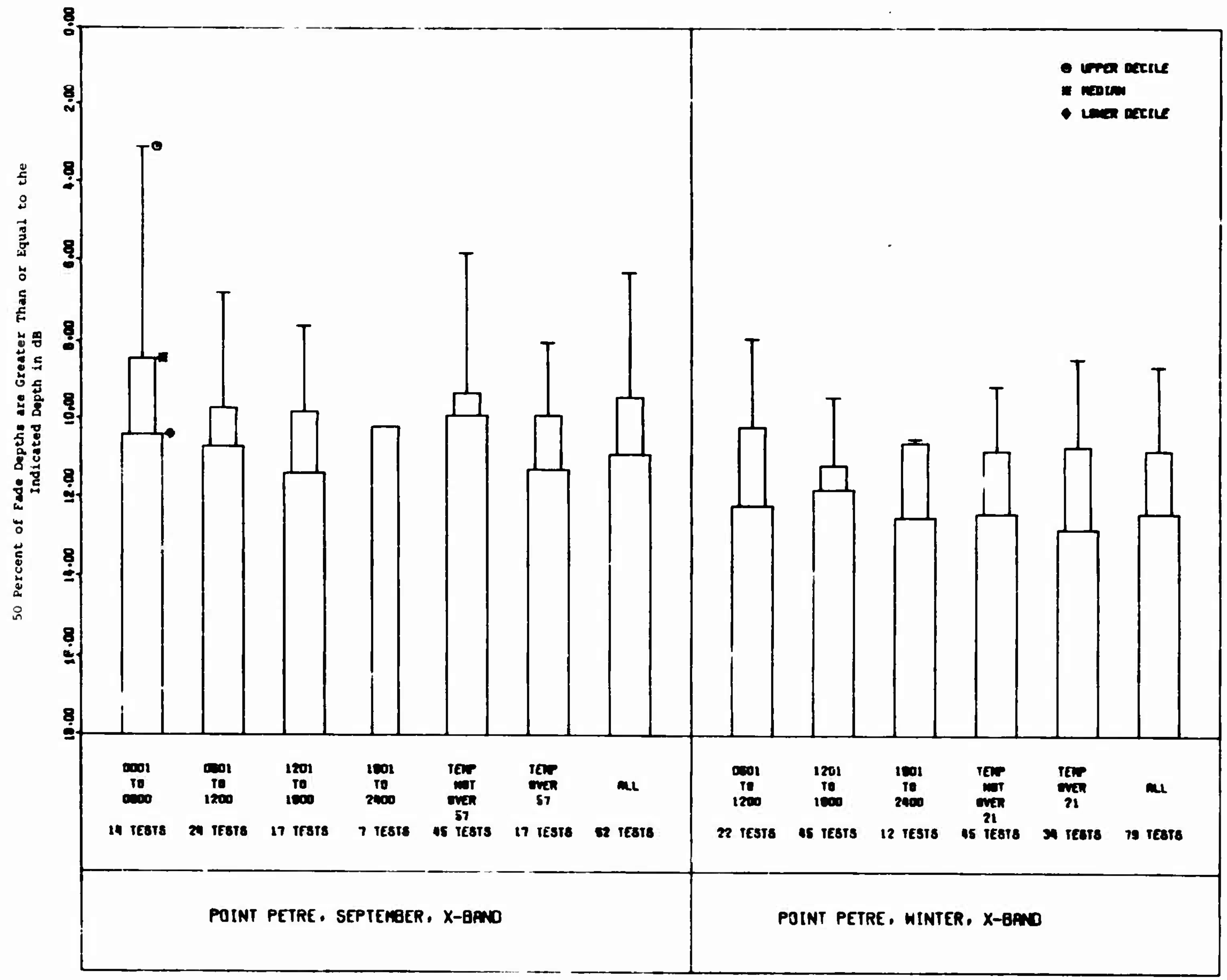


FADE DEPTH SUMMARY

Figure 343.

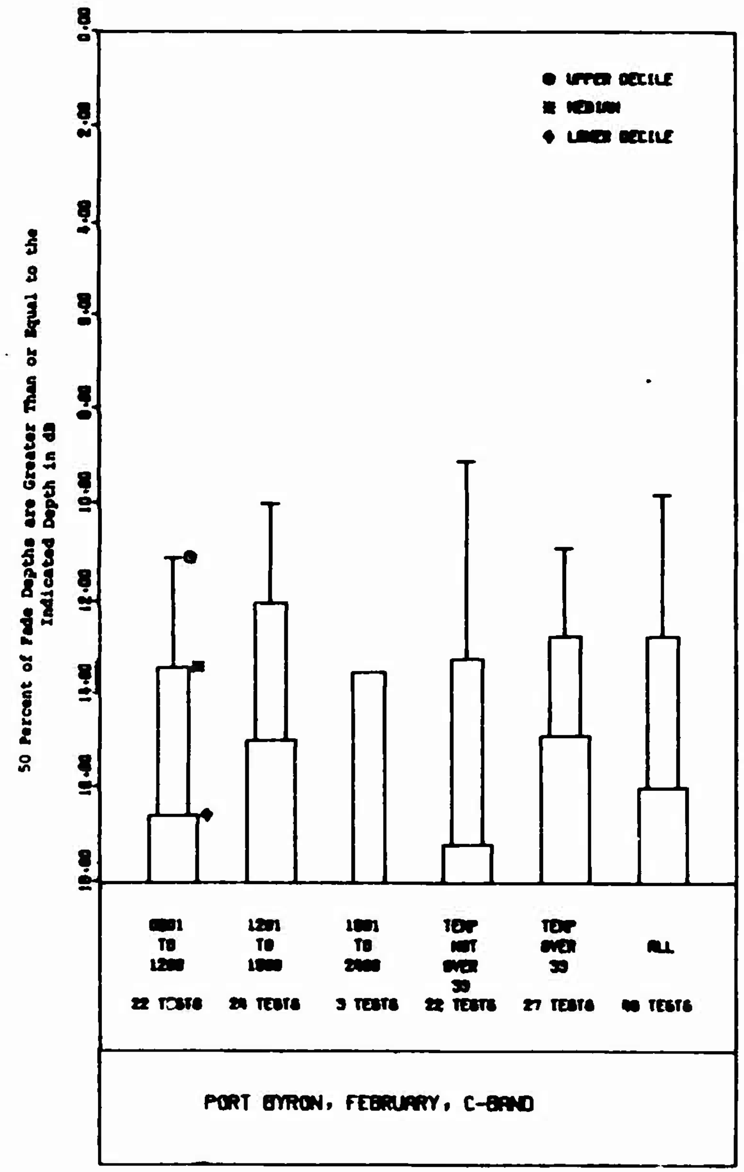


FADE DEPTH SUMMARY
Figure 344.

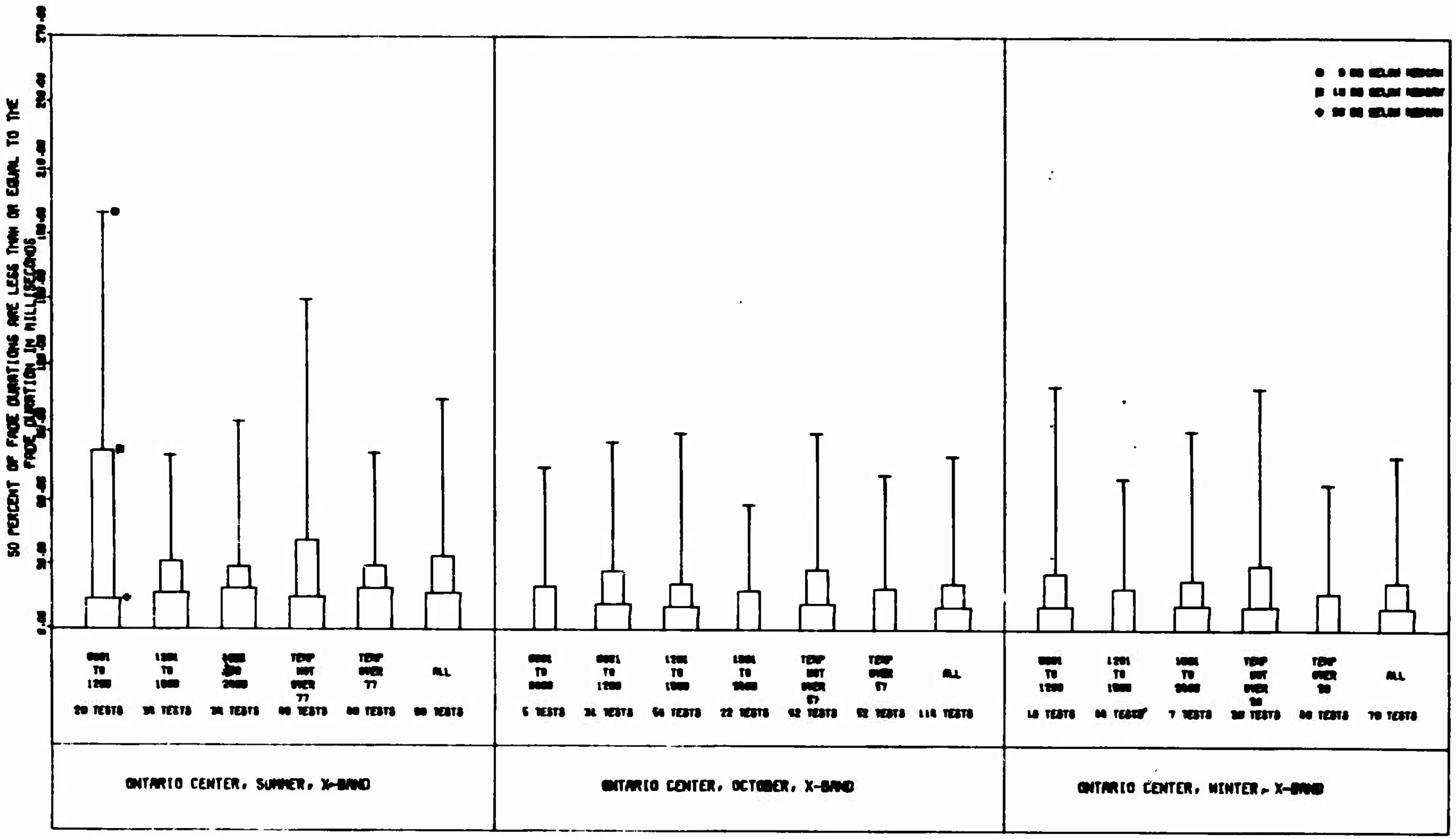


FADE DEPTH SUMMARY

Figure 345.

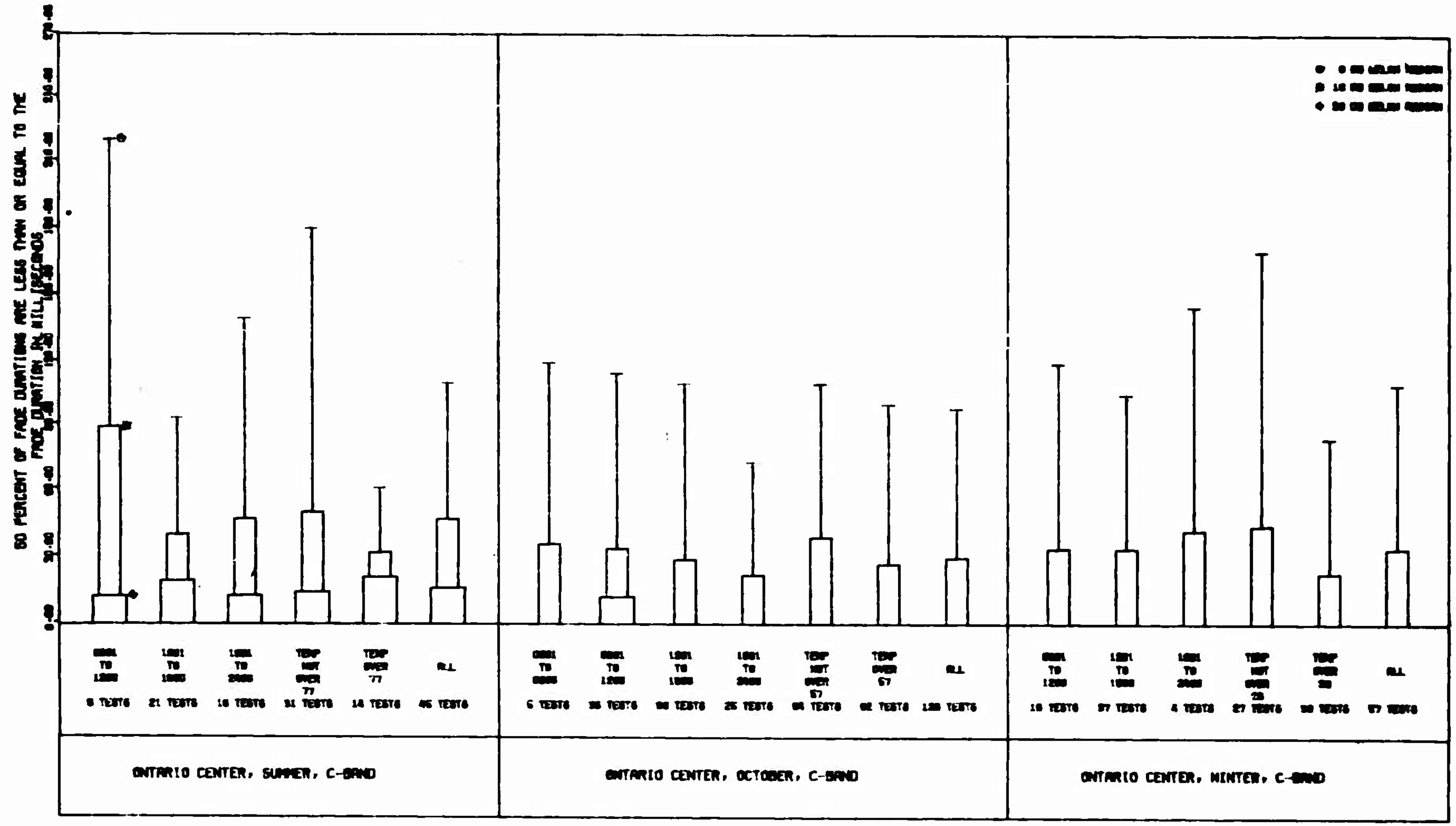


FADE DEPTH SUMMARY
Figure 346.



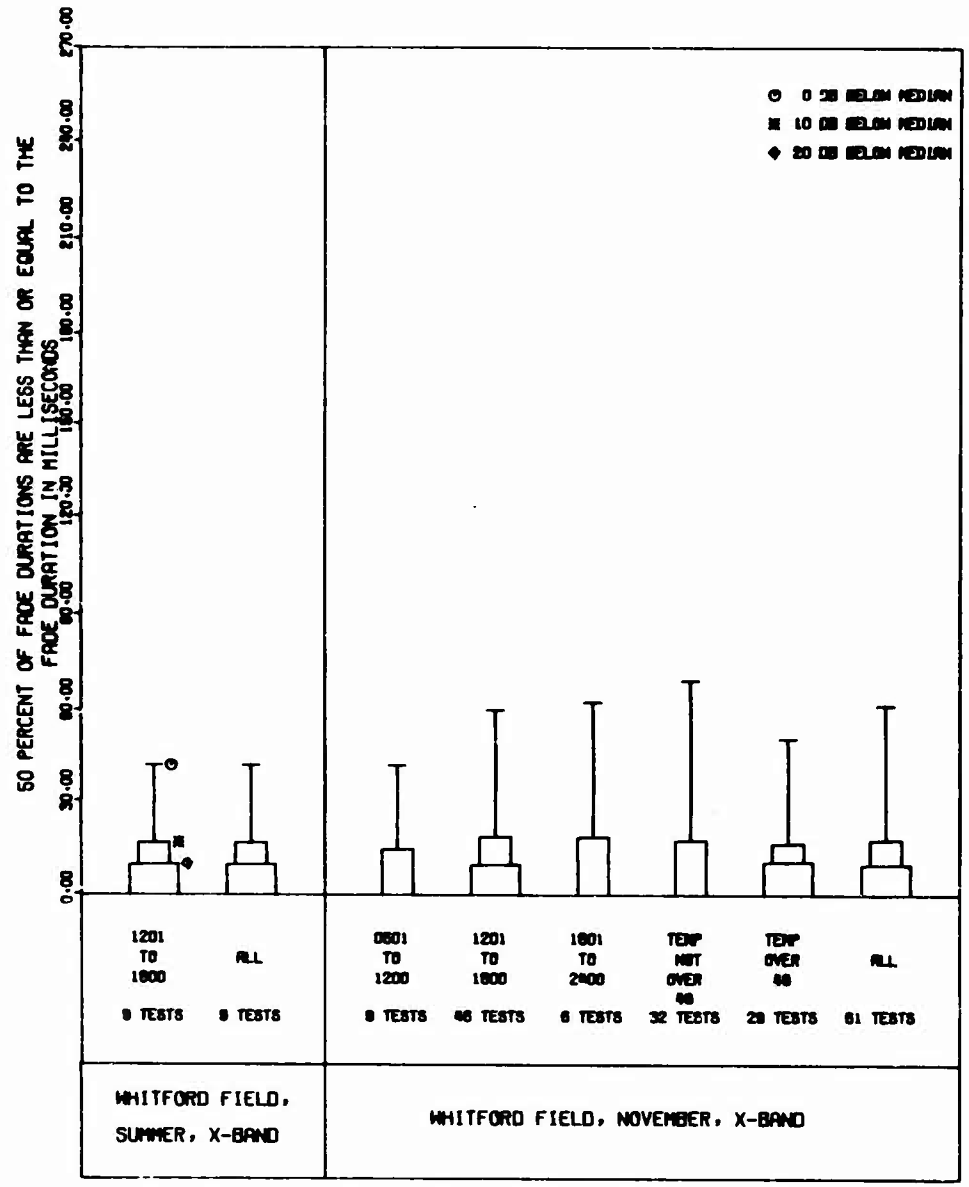
FADE DURATION SUMMARY

Figure 347.



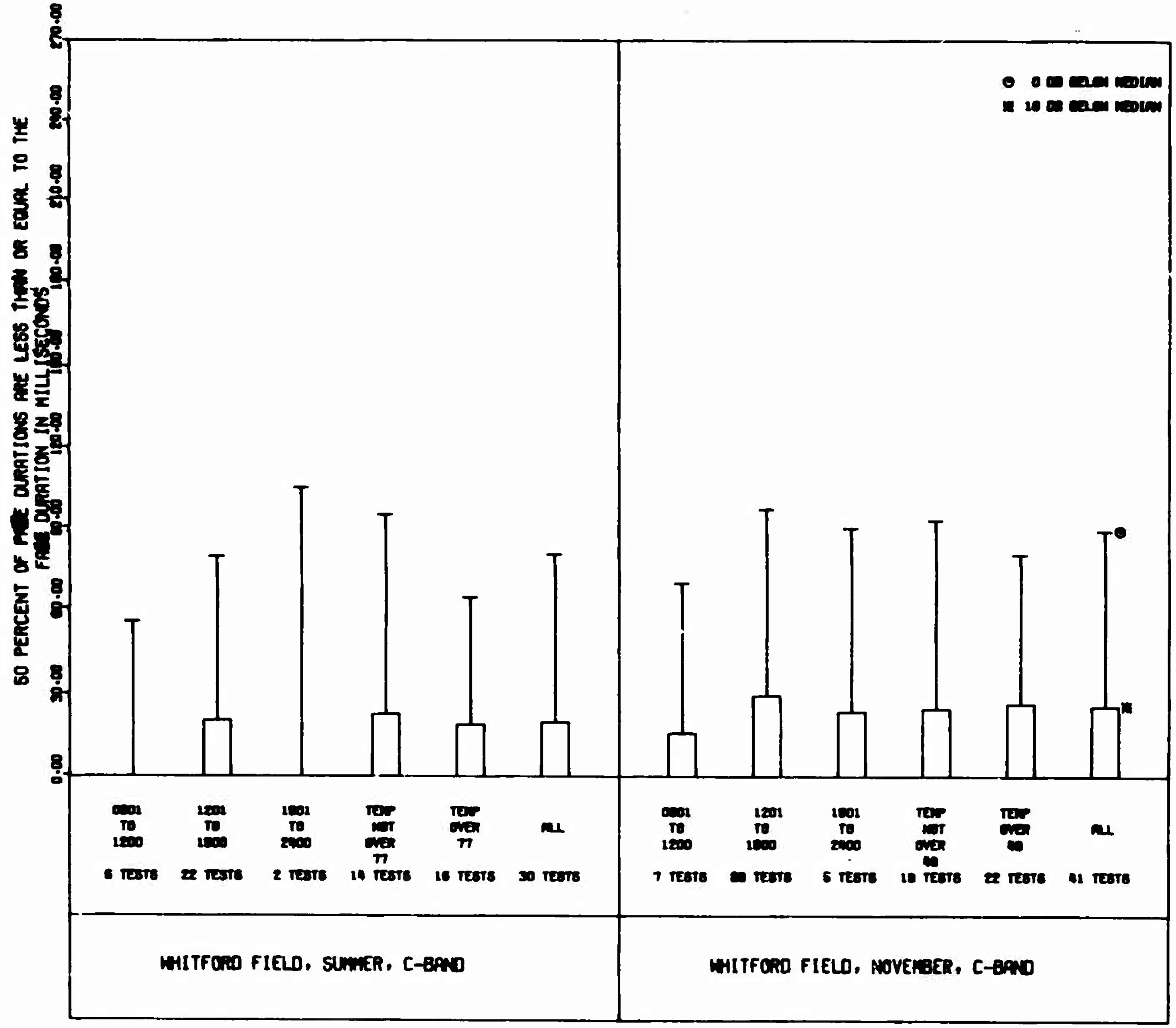
FADE DURATION SUMMARY

Figure 348.



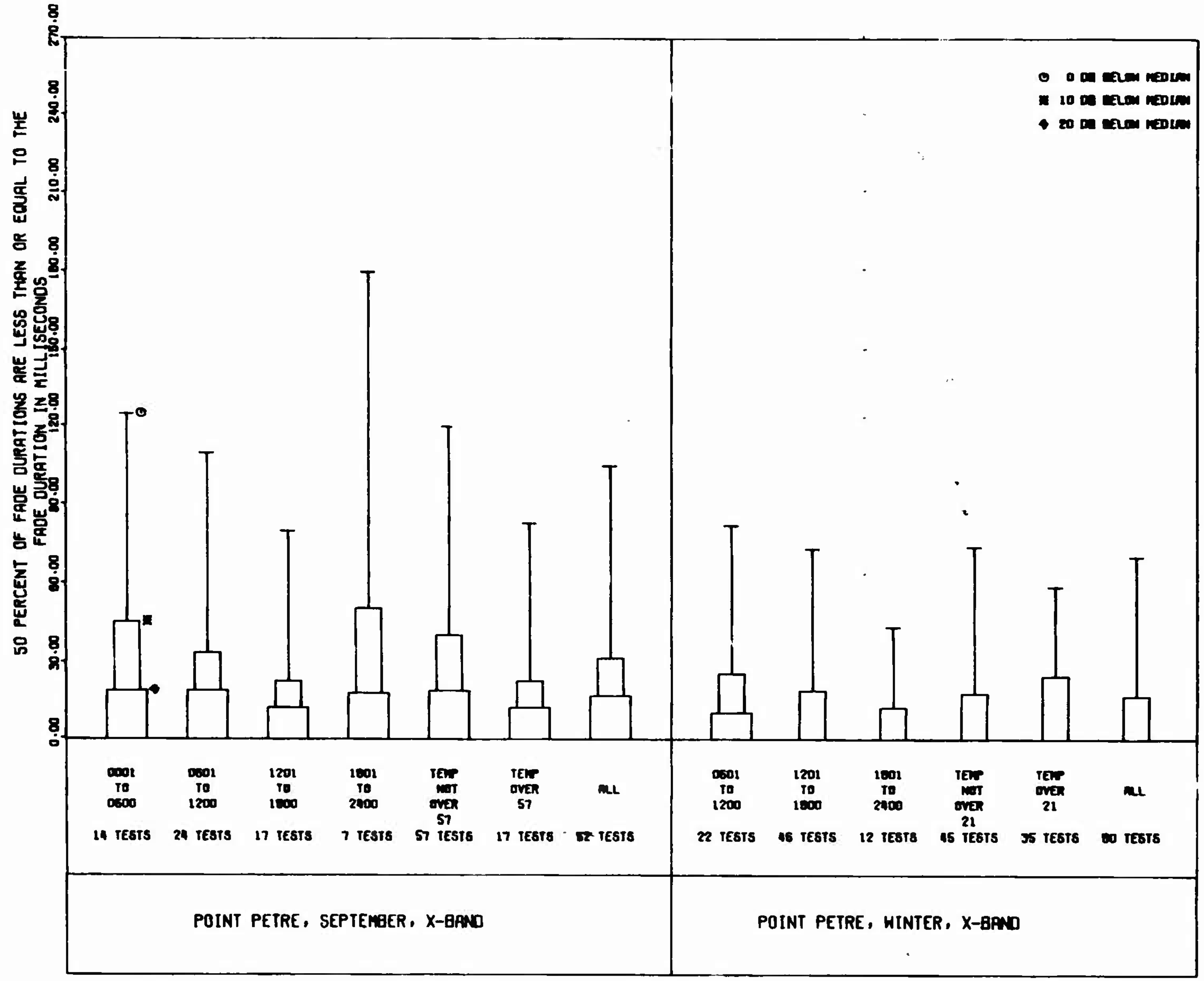
FADE DURATION SUMMARY

Figure 349.

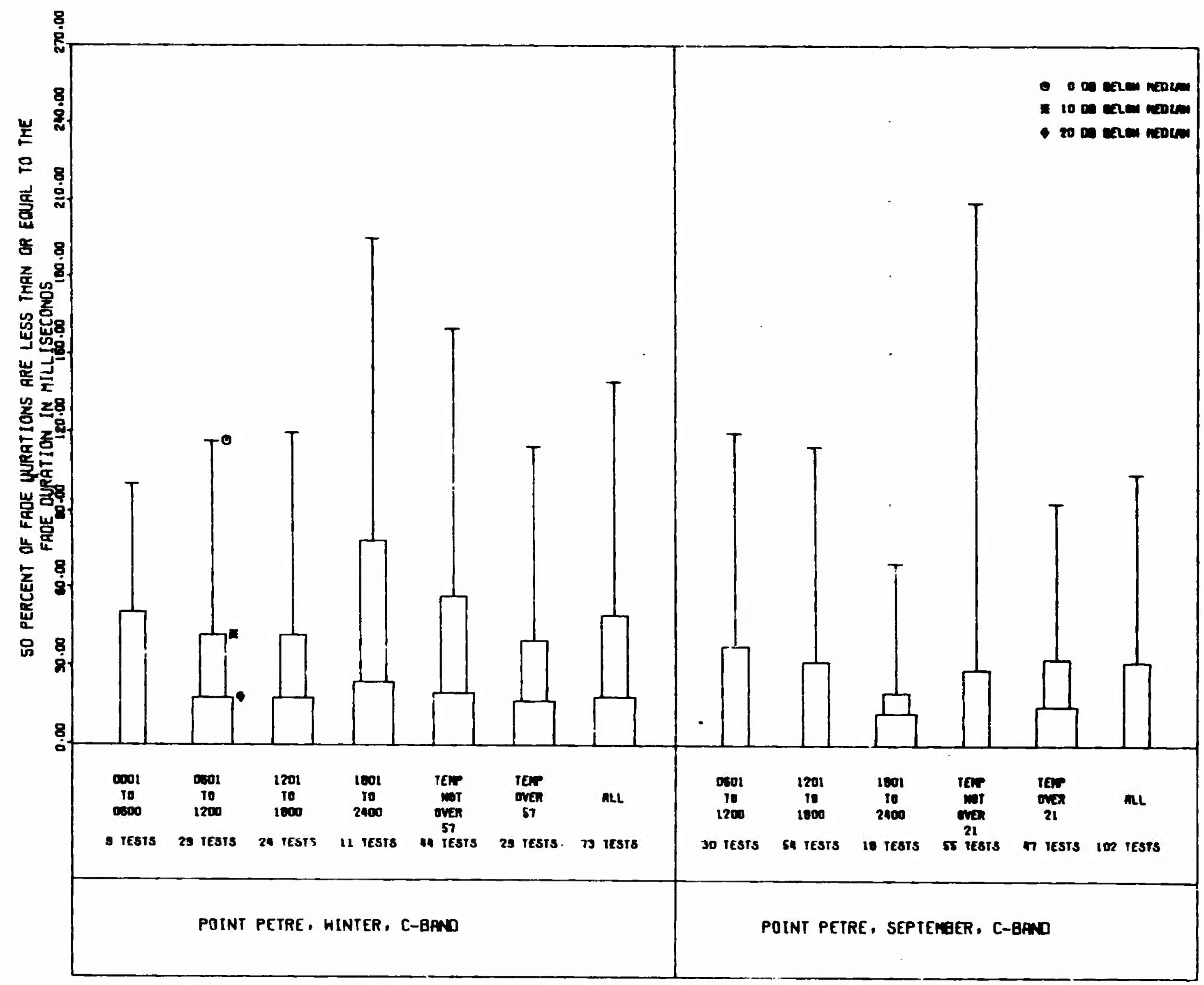


FADE DURATION SUMMARY

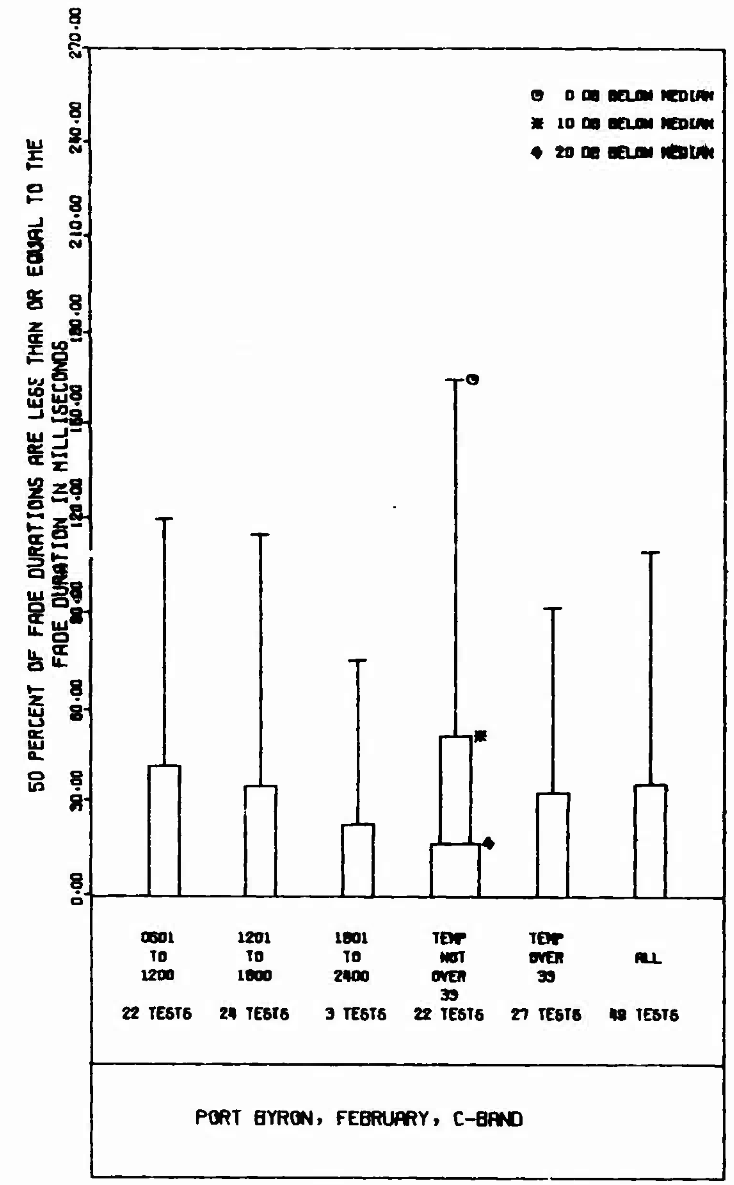
Figure 350.



FADE DURATION SUMMARY
Figure 351.

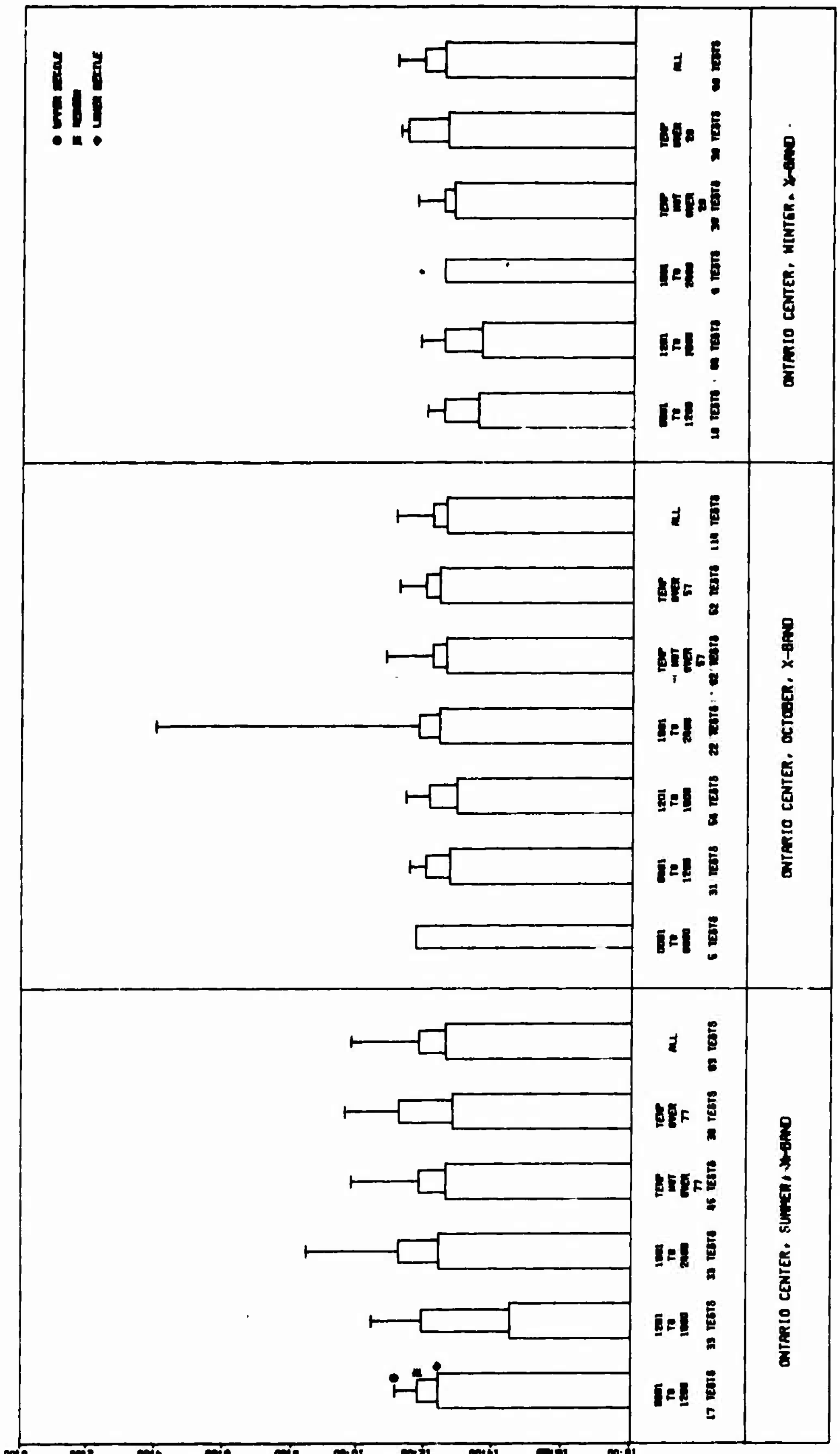


FADE DURATION SUMMARY
Figure 352.



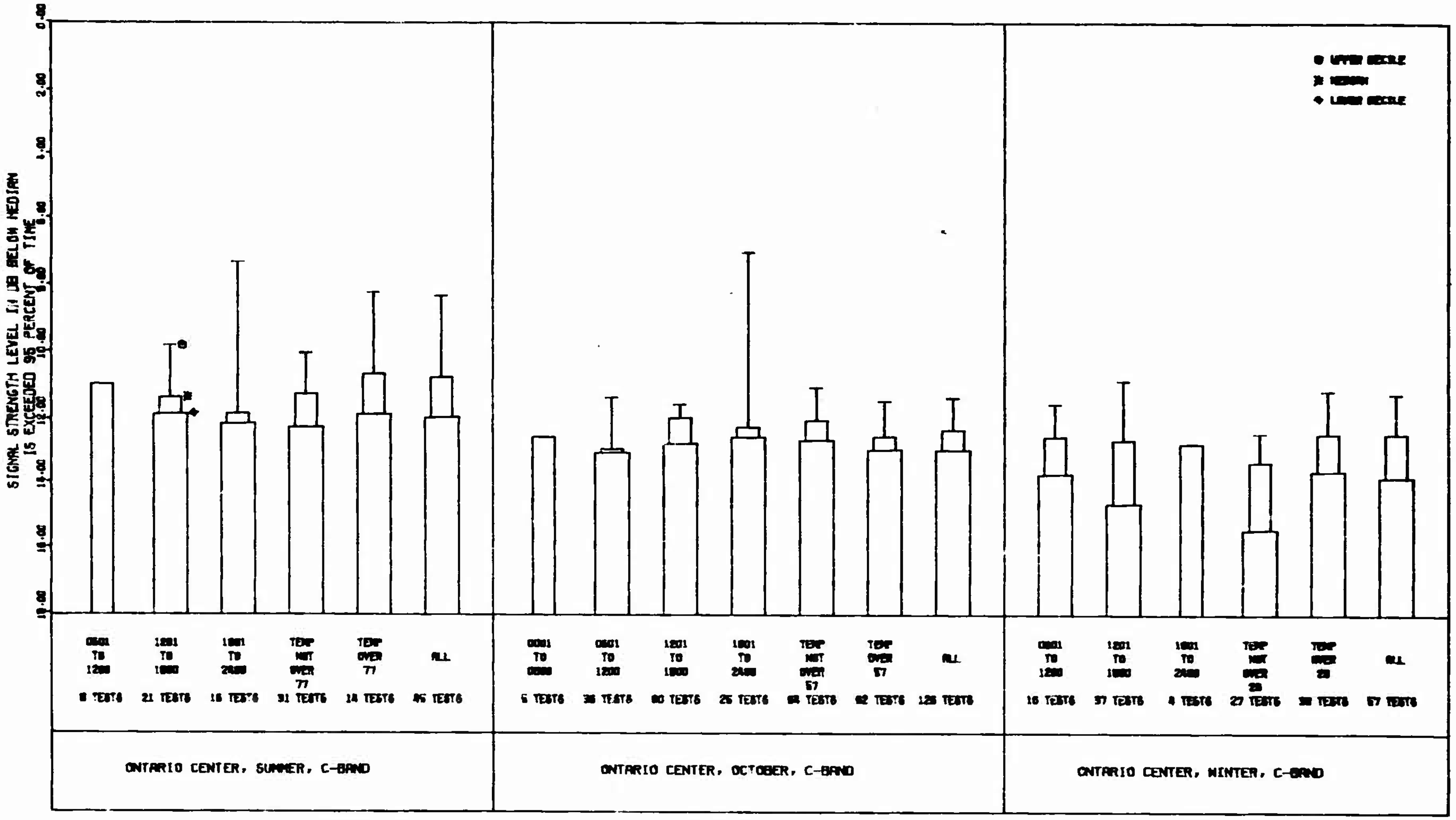
FADE DURATION SUMMARY

Figure 353.



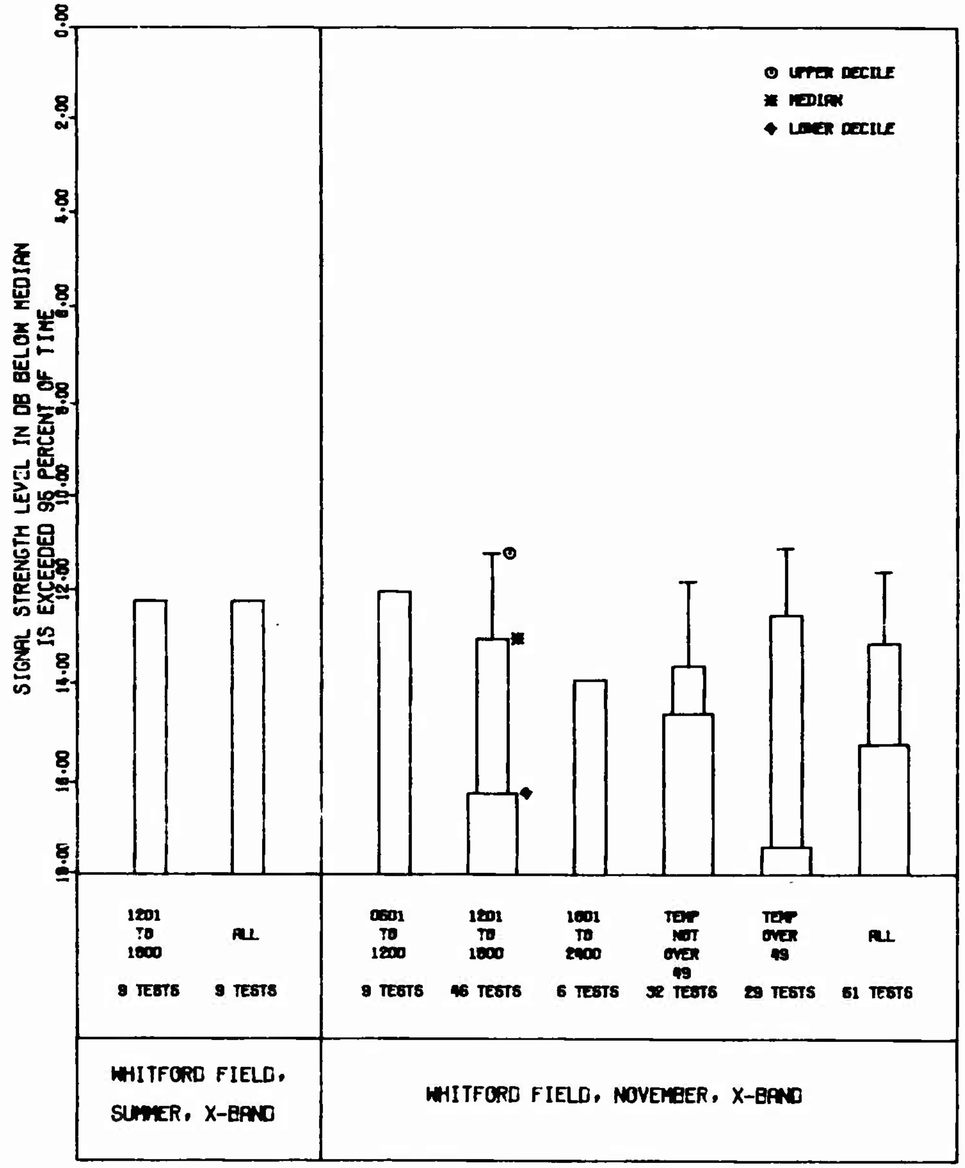
SIGNAL AMPLITUDE SUMMARY

Figure 354.



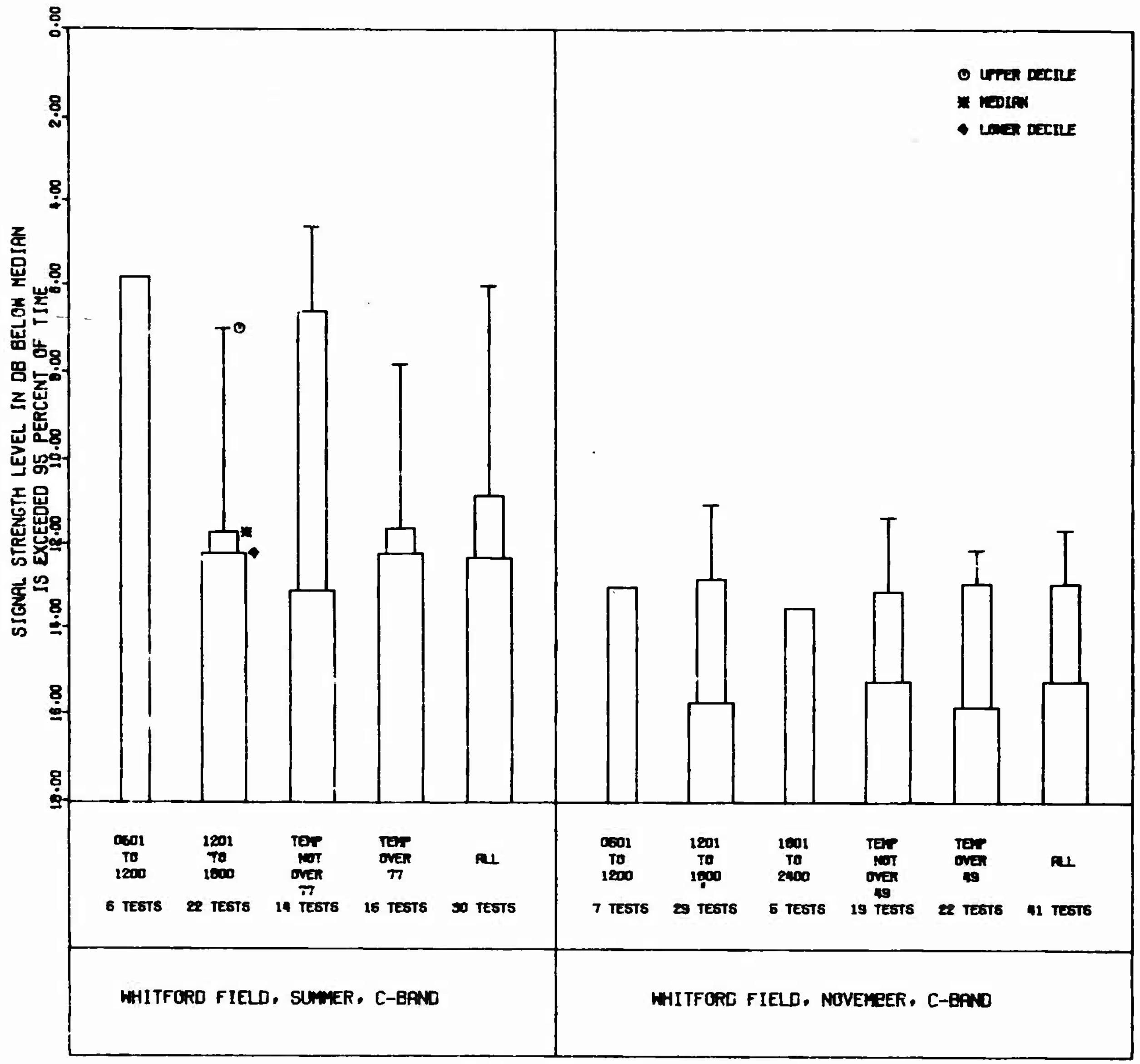
SIGNAL AMPLITUDE SUMMARY

Figure 355.

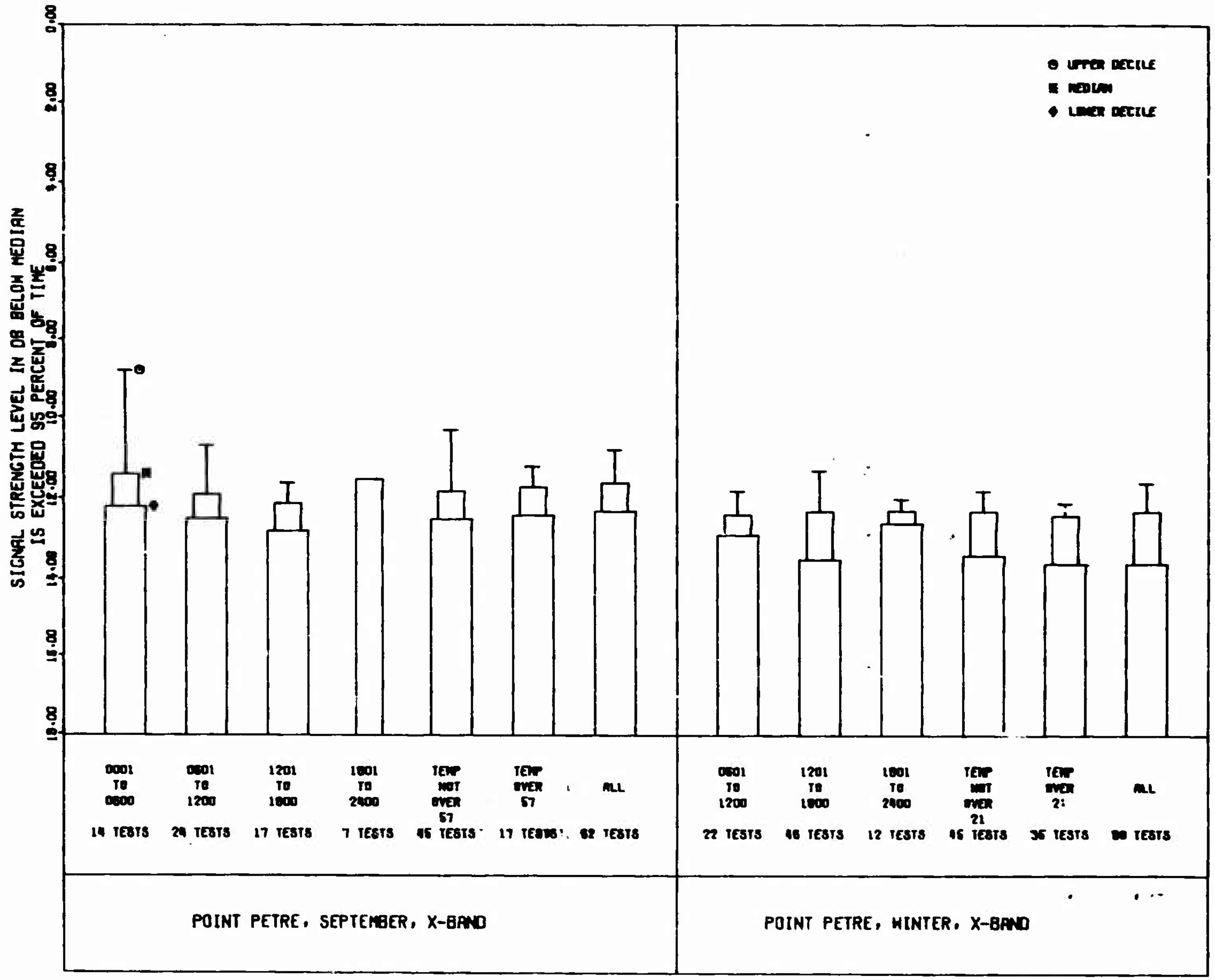


SIGNAL AMPLITUDE SUMMARY

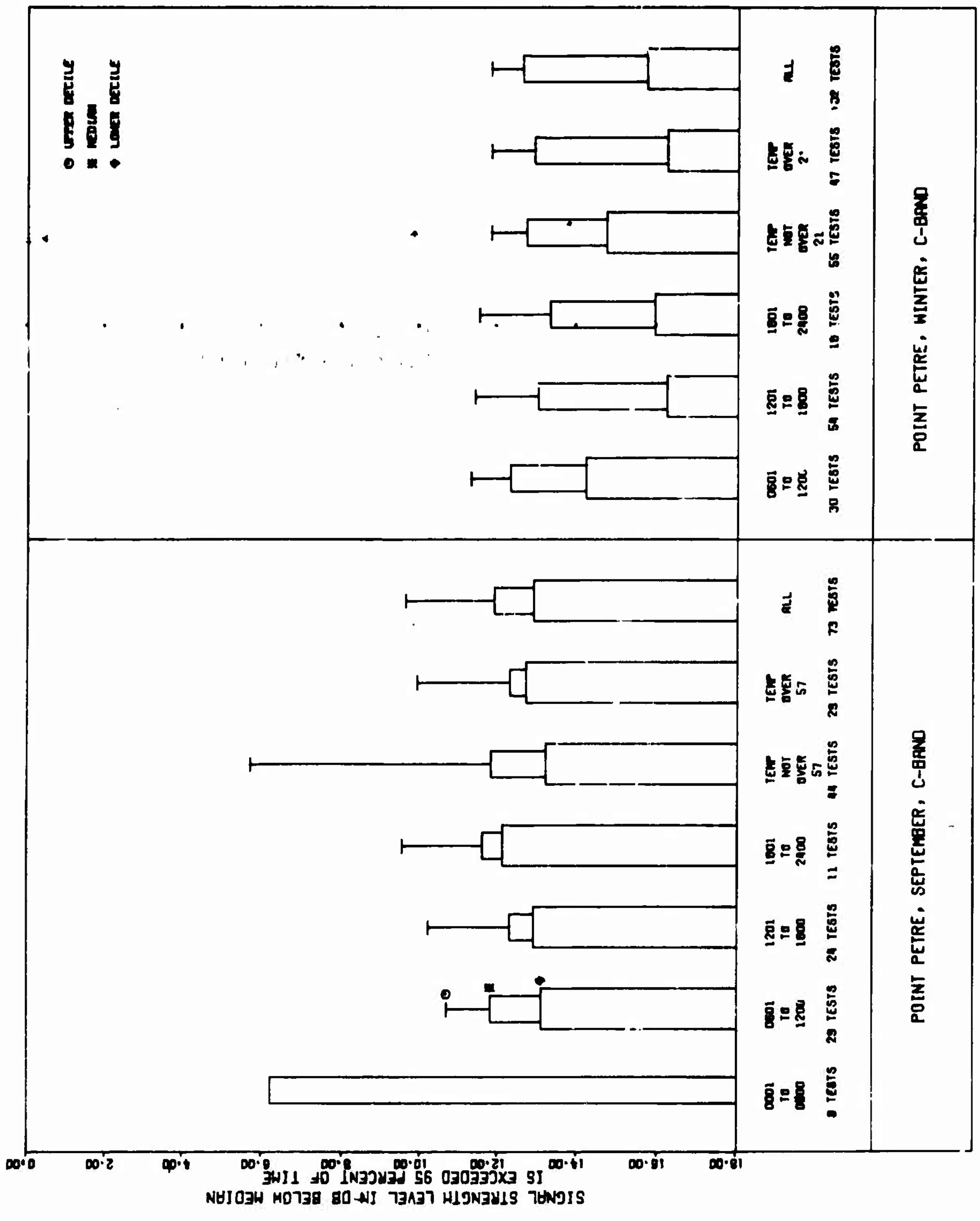
Figure 356.



SIGNAL AMPLITUDE SUMMARY
Figure 357.

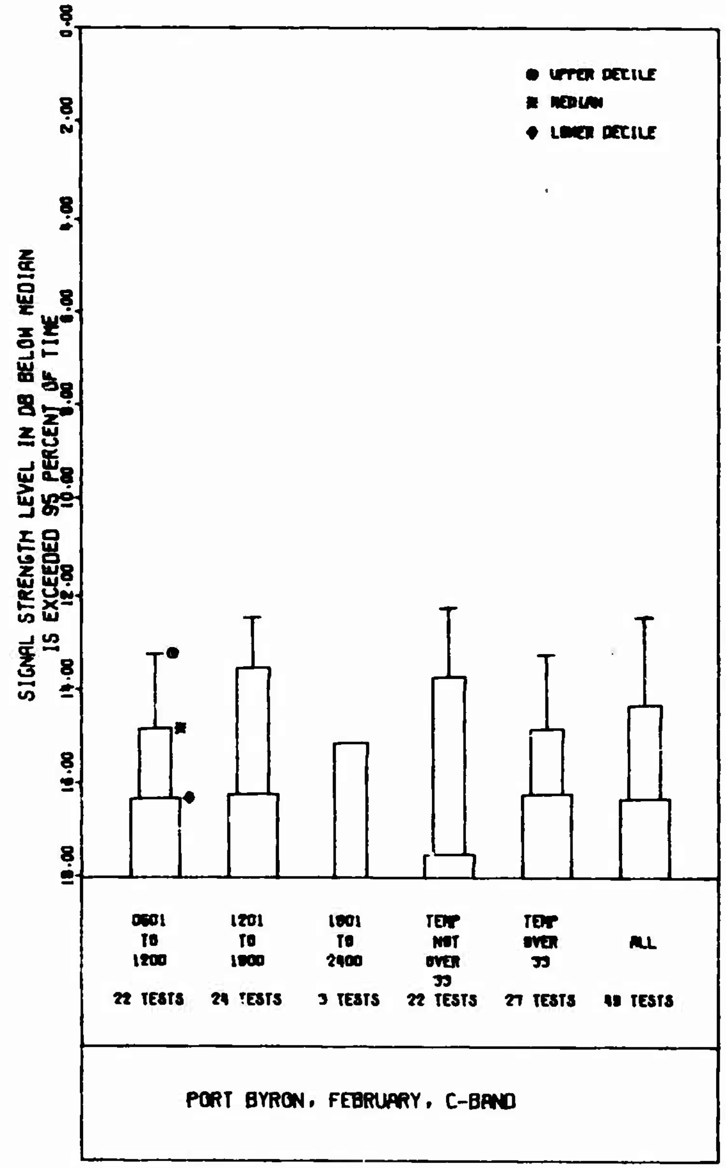


SIGNAL AMPLITUDE SUMMARY
Figure 358.



SIGNAL AMPLITUDE SUMMARY

Figure 359.



SIGNAL AMPLITUDE SUMMARY

Figure 360.

G. SIGNIFICANT FIELD OBSERVATIONS AND UNUSUAL PHENOMENA

Some unusual phenomena observed in the field tests were ducting and its associated high signal strengths. Ducting on C-band and a simultaneous normal situation on X-band was noticed on one occasion. High fade rates were observed many times due to propagation phenomena and due to aircraft. Occasionally there were unusual shapes in the correlation coefficient curves that suggest a (sin x)/x function versus frequency. There appear to be relationships between the cloud ceiling height and the received signal strengths and also the cloud ceiling height and the correlation bandwidths measured.

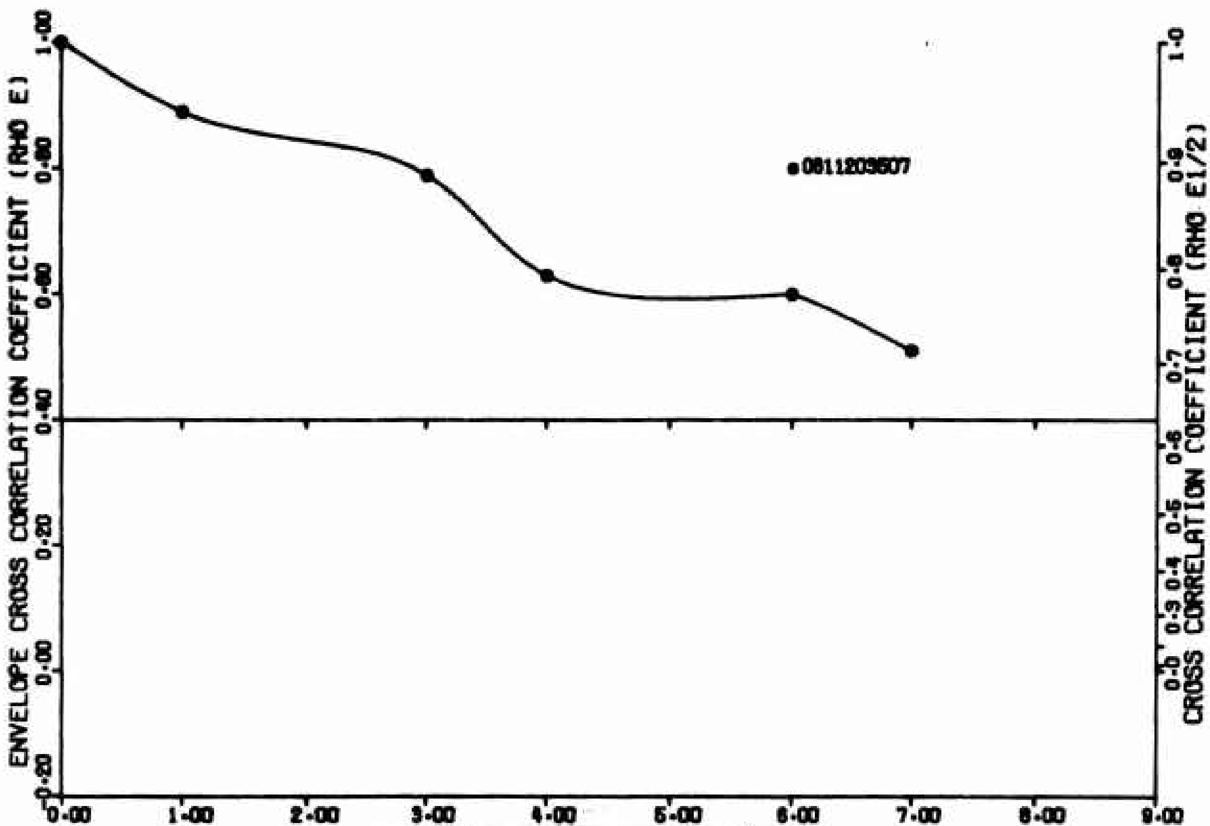
1. Ducting

Ducting signals are identified by their relatively high signal strengths and often low depth of fades accompanied usually by a wide correlation bandwidth. However, the high signal strength is the only common denominator observed in all ducting situations identified during these tests. Figures 361 through 364 show a case of X-band ducting observed at Ontario Center on 11 August at 2035. (The C-band transmitter was not operating at this time.) The correlation bandwidth is seen to be very wide, but the fades on which the computation was made are very shallow and seldom more than 5 dB below the median. The fade rate is enormous with 10 percent of the fades greater than 60 Hz. In this situation the signal strengths were in the vicinity of -60 dBm. At 2300 on this same date ducting occurred again with the C-band results shown in Figures 365 through 368. Here the correlation bandwidth is narrow with some fades greater than 5 dB below the median. The signal strength was about -66 dBm.

Usually ducting was observed on the Ontario Center and the Point Petre paths in the summer and early fall. This phenomena was never identified on the Whitford Field or Port Byron paths. At Whitford, the antenna take-off angle was probably too large for ducting to occur, while on the Port Byron path the winter conditions and short testing period reduced the probability of observing any ducting phenomena. Ducting usually occurred at night from about two hours after sunset until about an hour before sunrise. In all cases the C-band went into ducting prior to X-band and remained after the X-band signal had returned to normal. In one instance over the Point Petre path, a ducting condition produced a signal strength of -50 dBm on C-band with a transmitted power of only 6 watts.

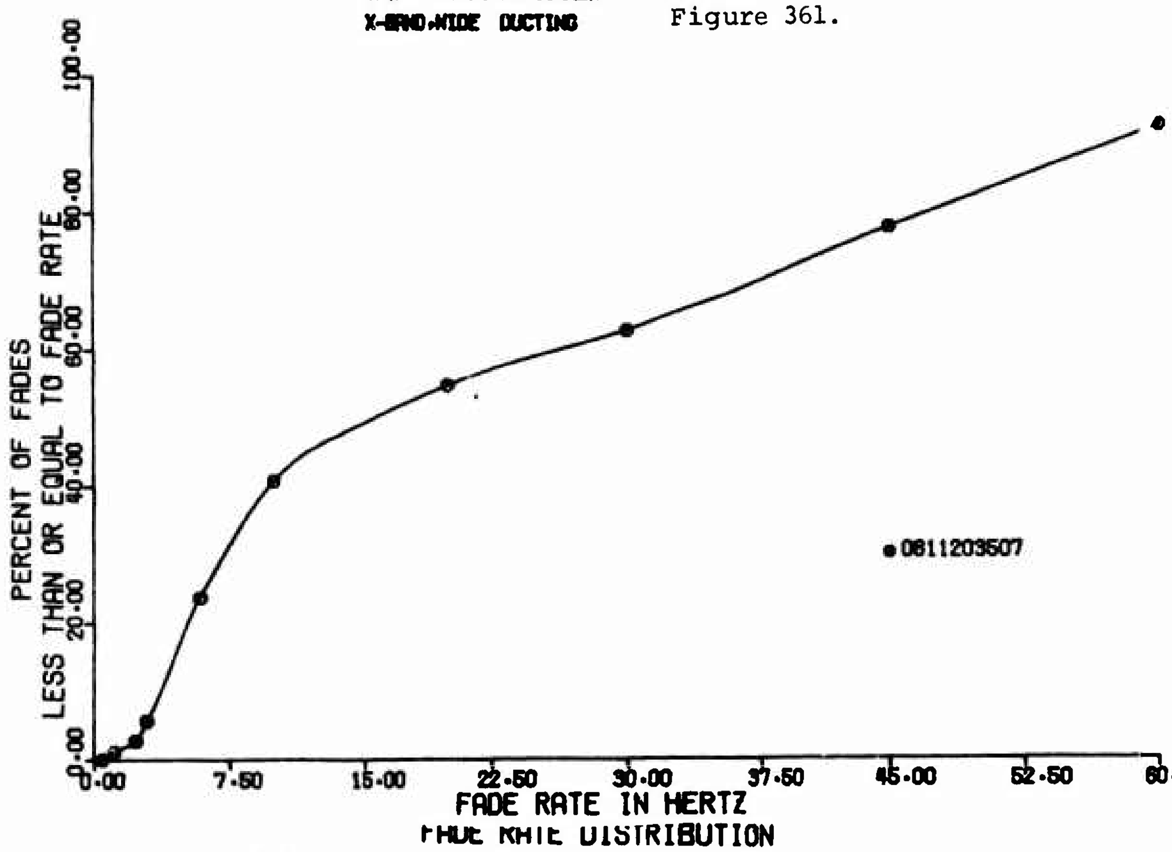
Another case of ducting occurred at Point Petre where evidently the C-band was experiencing a more classic case while X-band was not fully ducting. Figures 369 through 373 show the C-band propagation and Figures 374 through 378 show the X-band. The signal strength was -76 dBm for X-band and -66 dBm for C-band. The C-band ducting had the wide correlation bandwidth, very high fade rates with mostly shallow fades of which 80 percent were less than 4 dB. The unexpected phenomenon is that the X-band was not strictly ducting. True, it had a wide correlation bandwidth most

of the time, but the fade rates were within typical bounds and so were the signal amplitude, fade duration, and depth distributions. In this type of environment the signal is of such strength that both frequency-time and adoptive frequency modems operate very well. The loss of diversity gain is not important.



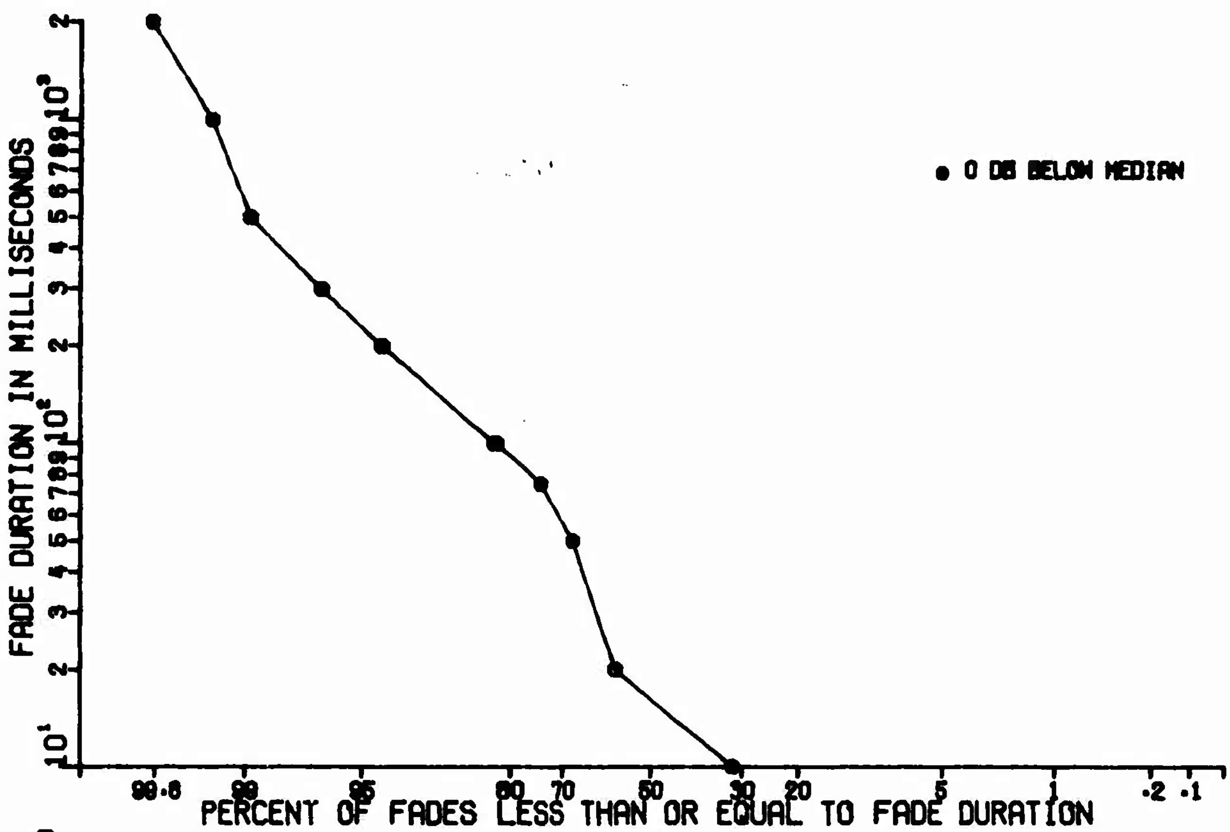
ENVELOPE CROSS CORRELATION COEFFICIENTS
ONTARIO CENTER, SUMMER
X-BAND-WIDE DUCTING

Figure 361.



FADE RATE DISTRIBUTION
ONTARIO CENTER, SUMMER
X-BAND DUCTING

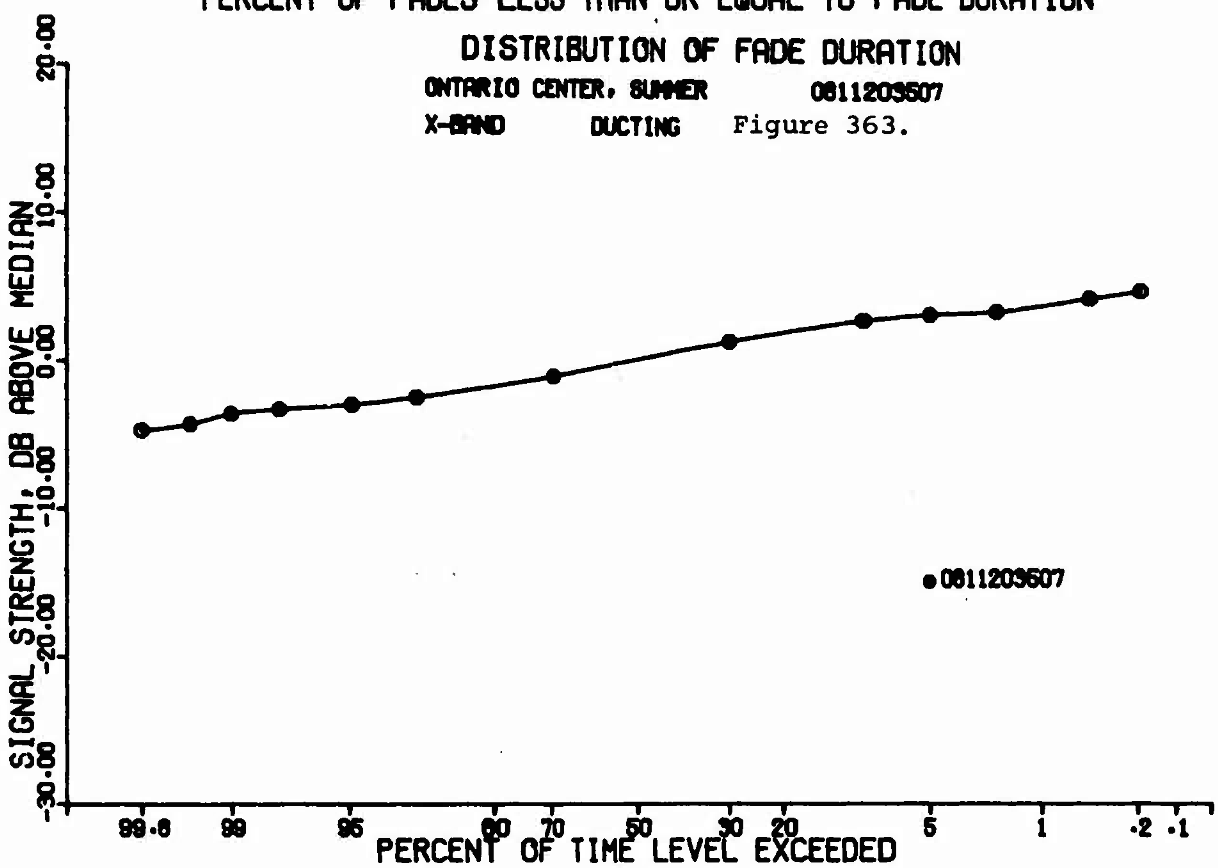
Figure 362.



DISTRIBUTION OF FADE DURATION

ONTARIO CENTER, SUMMER 0811203507

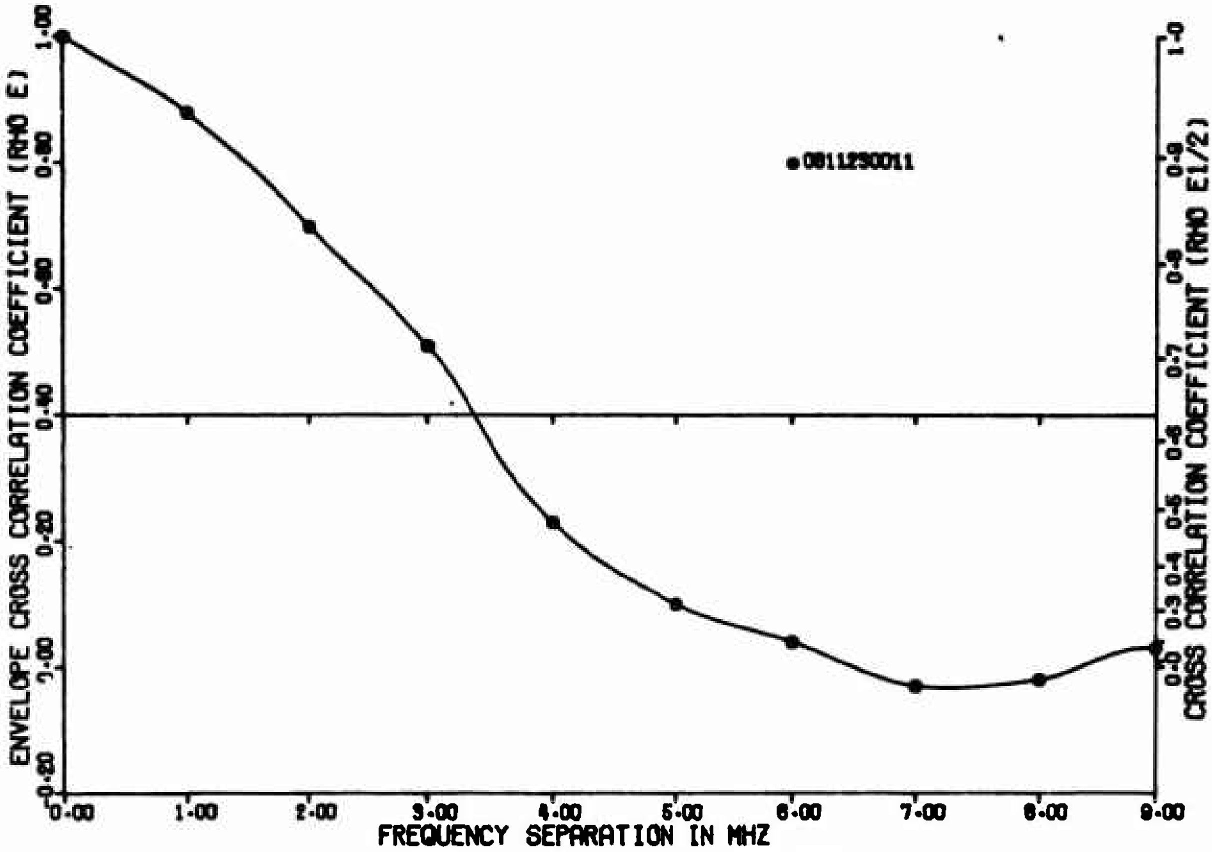
X-BAND DUCTING Figure 363.



SIGNAL AMPLITUDE LEVEL

ONTARIO CENTER, SUMMER

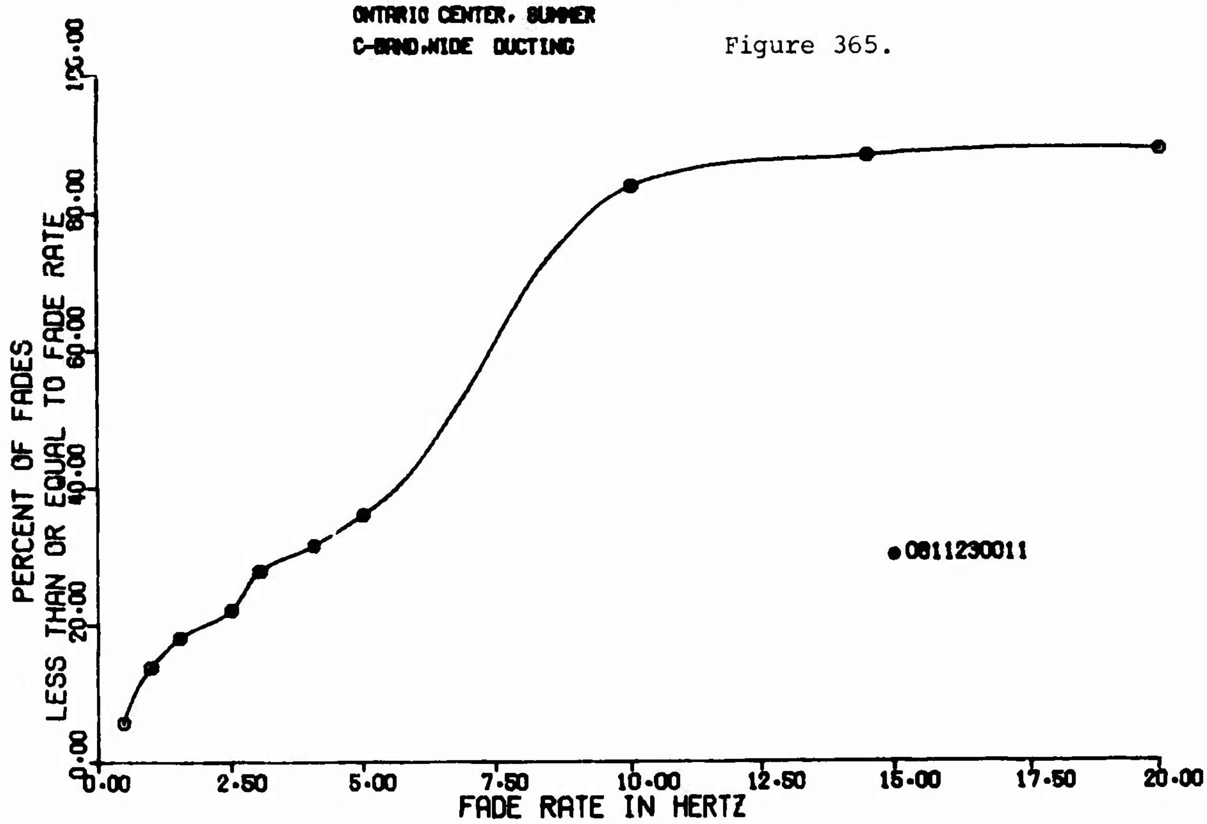
X-BAND DUCTING Figure 364.



ENVELOPE CROSS CORRELATION COEFFICIENTS

ONTARIO CENTER, SUMMER

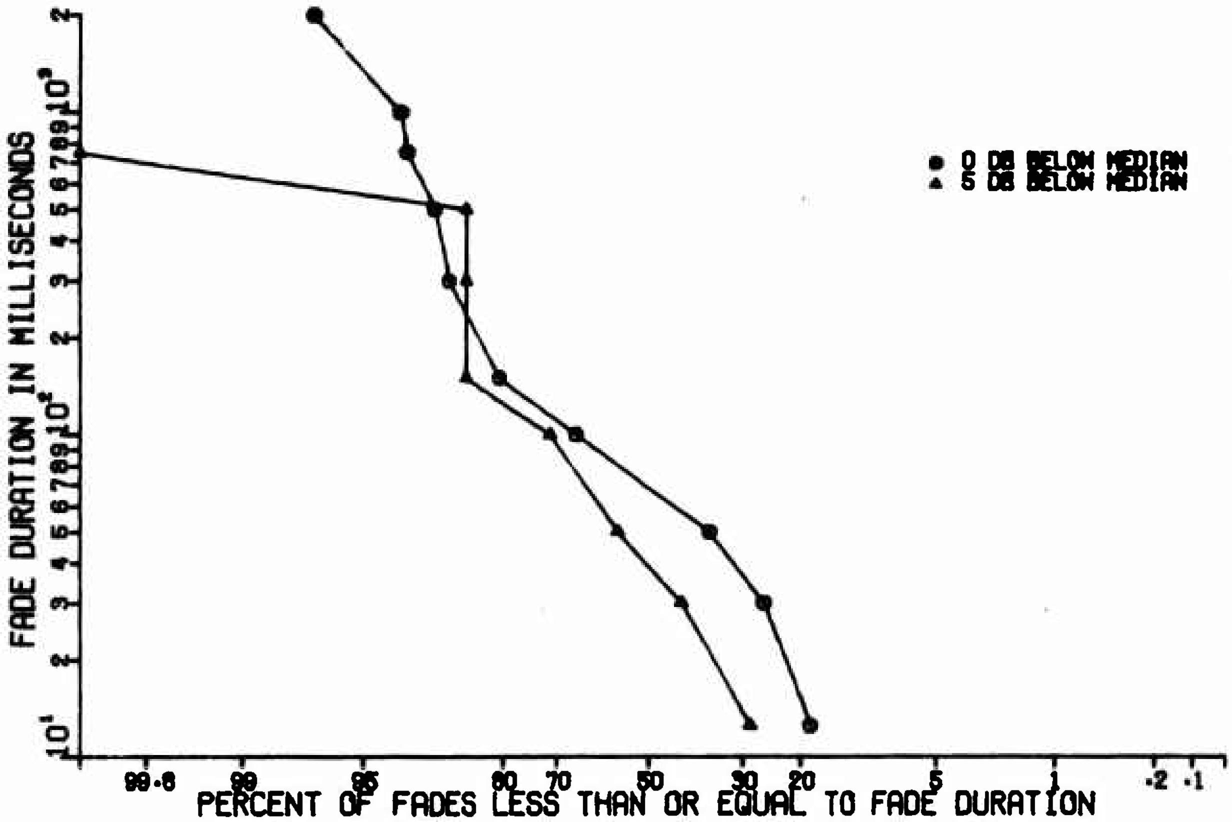
C-BAND,WIDE DUCTING Figure 365.



FADE RATE DISTRIBUTION

ONTARIO CENTER, SUMMER

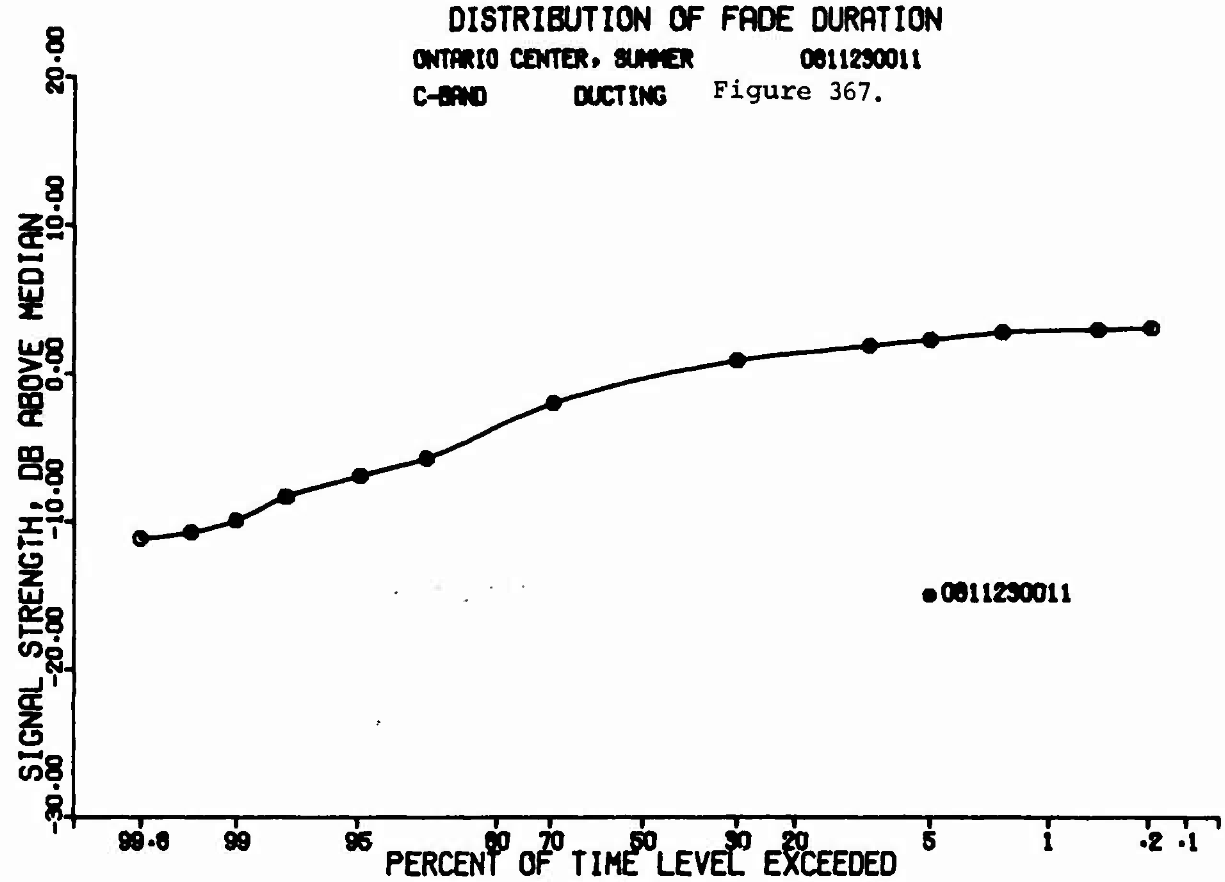
C-BAND DUCTING Figure 366.



DISTRIBUTION OF FADE DURATION

ONTARIO CENTER, SUMMER 0811290011

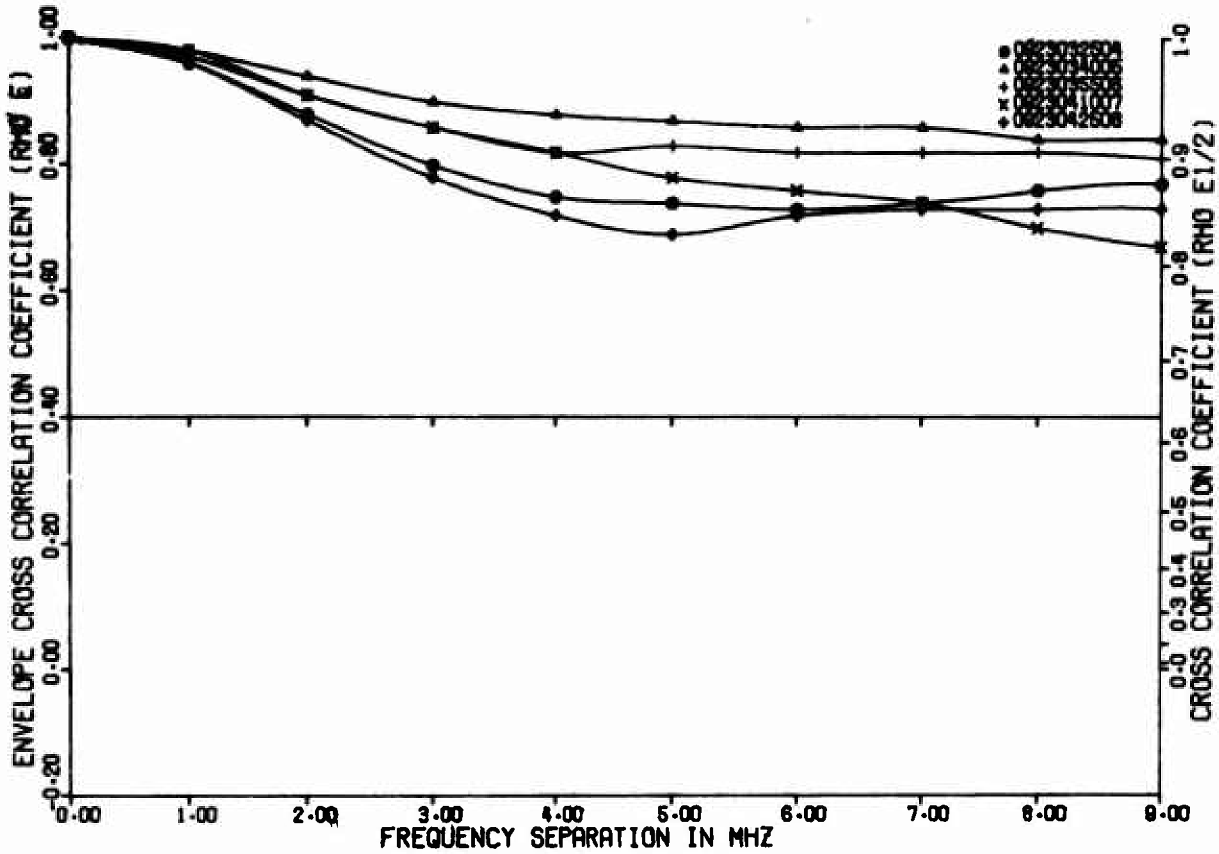
C-BAND DUCTING Figure 367.



SIGNAL AMPLITUDE LEVEL

ONTARIO CENTER, SUMMER

C-BAND DUCTING Figure 368.

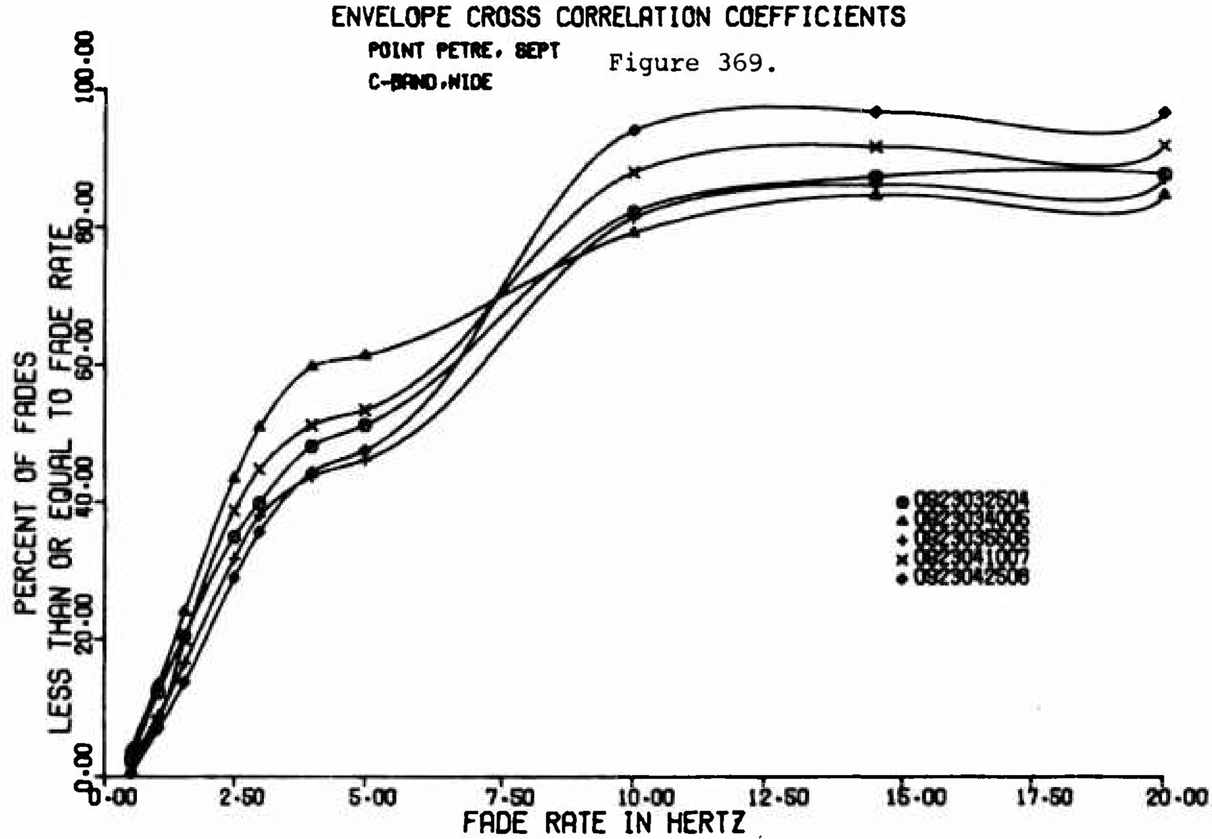


ENVELOPE CROSS CORRELATION COEFFICIENTS

POINT PETRE, SEPT

C-BAND,WIDE

Figure 369.

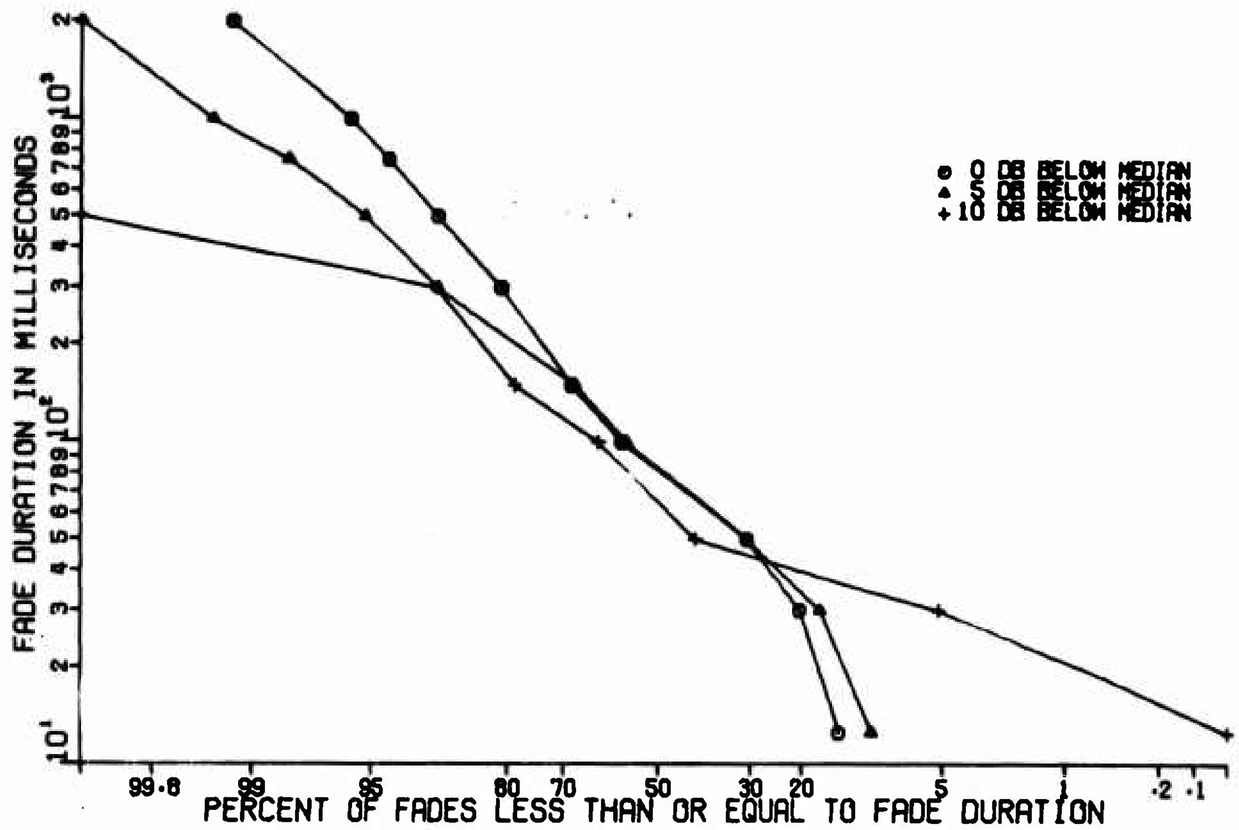


FADE RATE DISTRIBUTION

POINT PETRE, SEPT

C-BAND

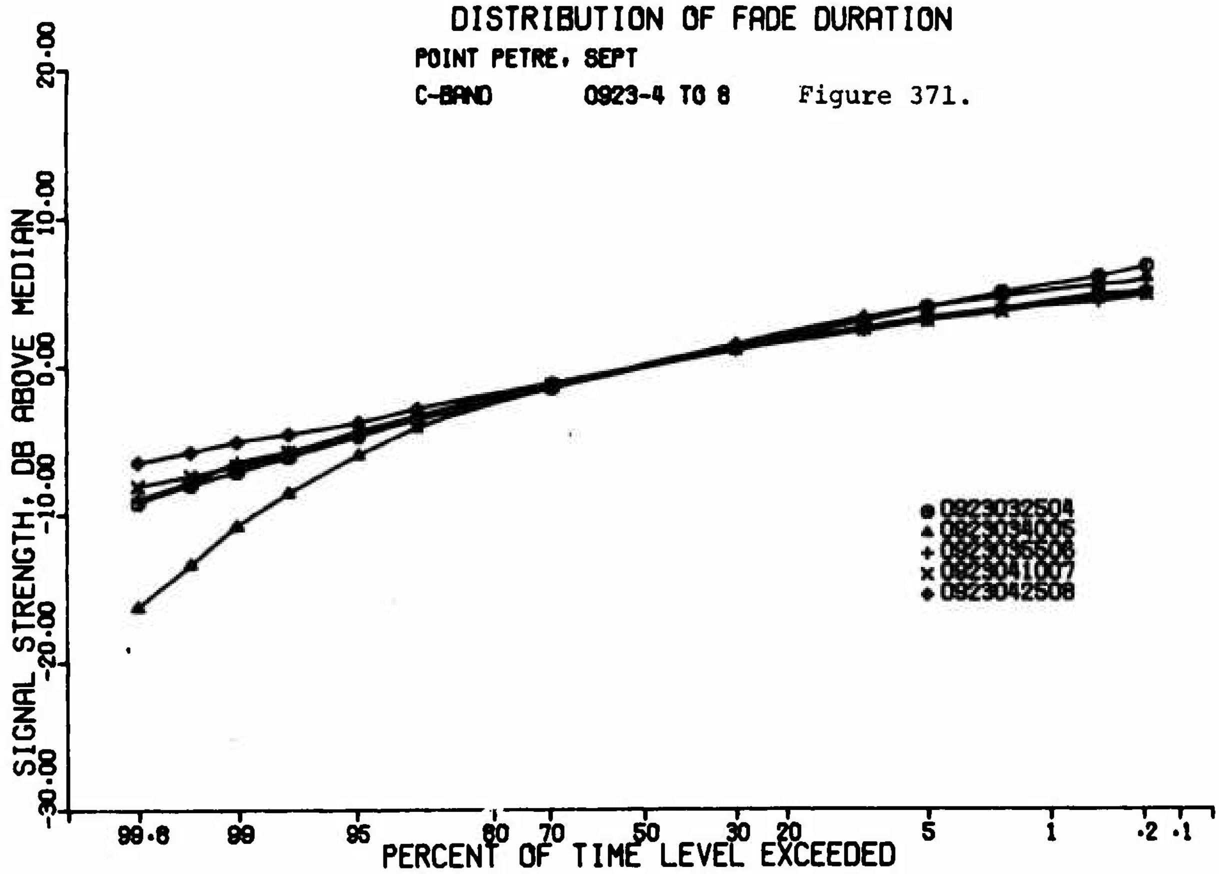
Figure 370.



DISTRIBUTION OF FADE DURATION

POINT PETRE, SEPT

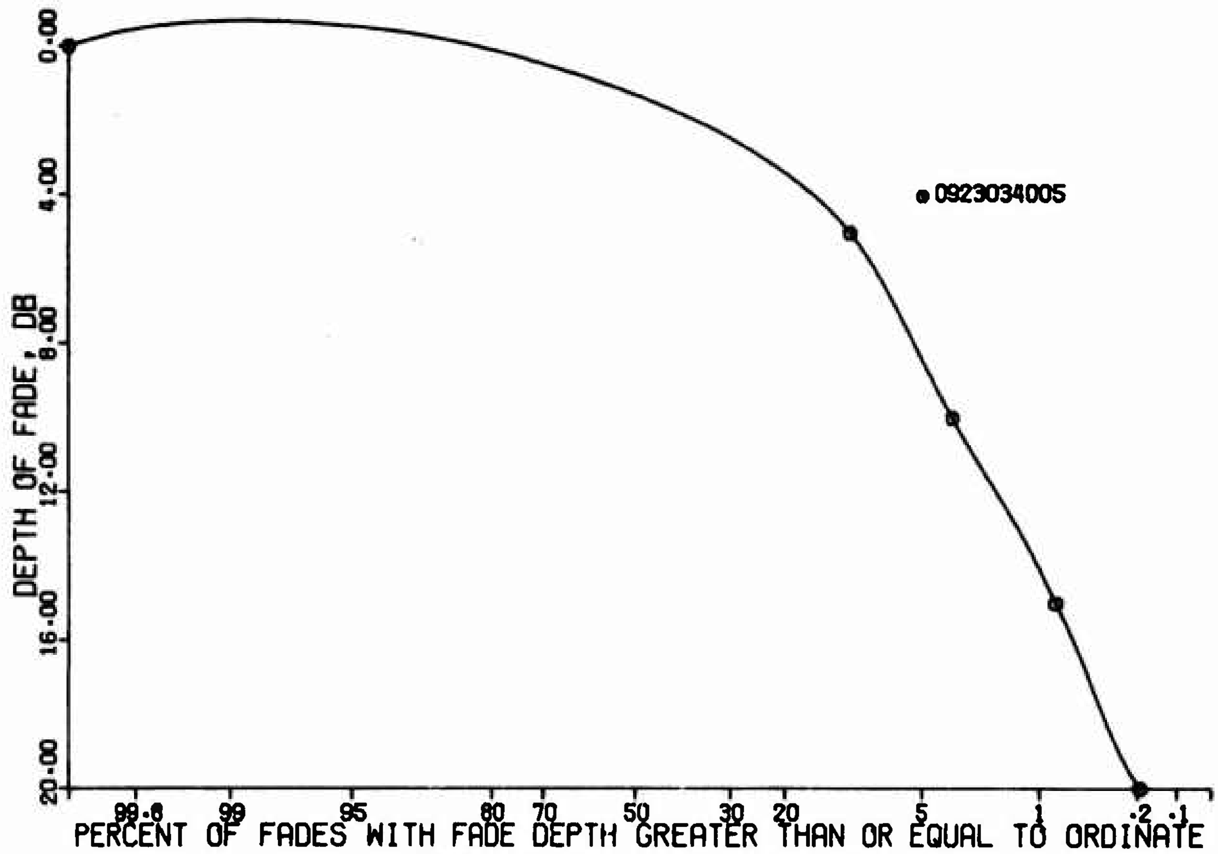
C-BAND 0923-4 TO 8 Figure 371.



SIGNAL AMPLITUDE LEVEL

POINT PETRE, SEPT

C-BAND Figure 372.

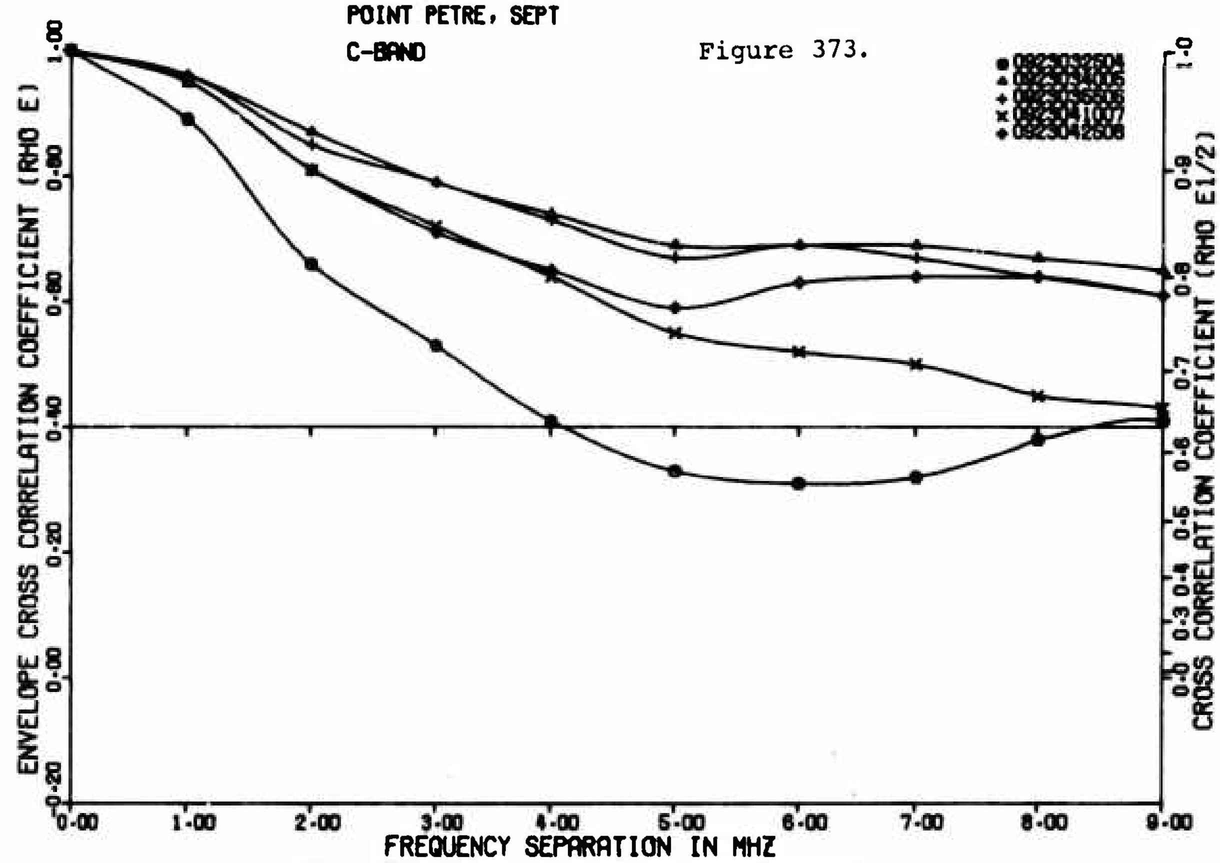


DISTRIBUTION OF DEPTH OF FADES

POINT PETRE, SEPT

C-BAND

Figure 373.

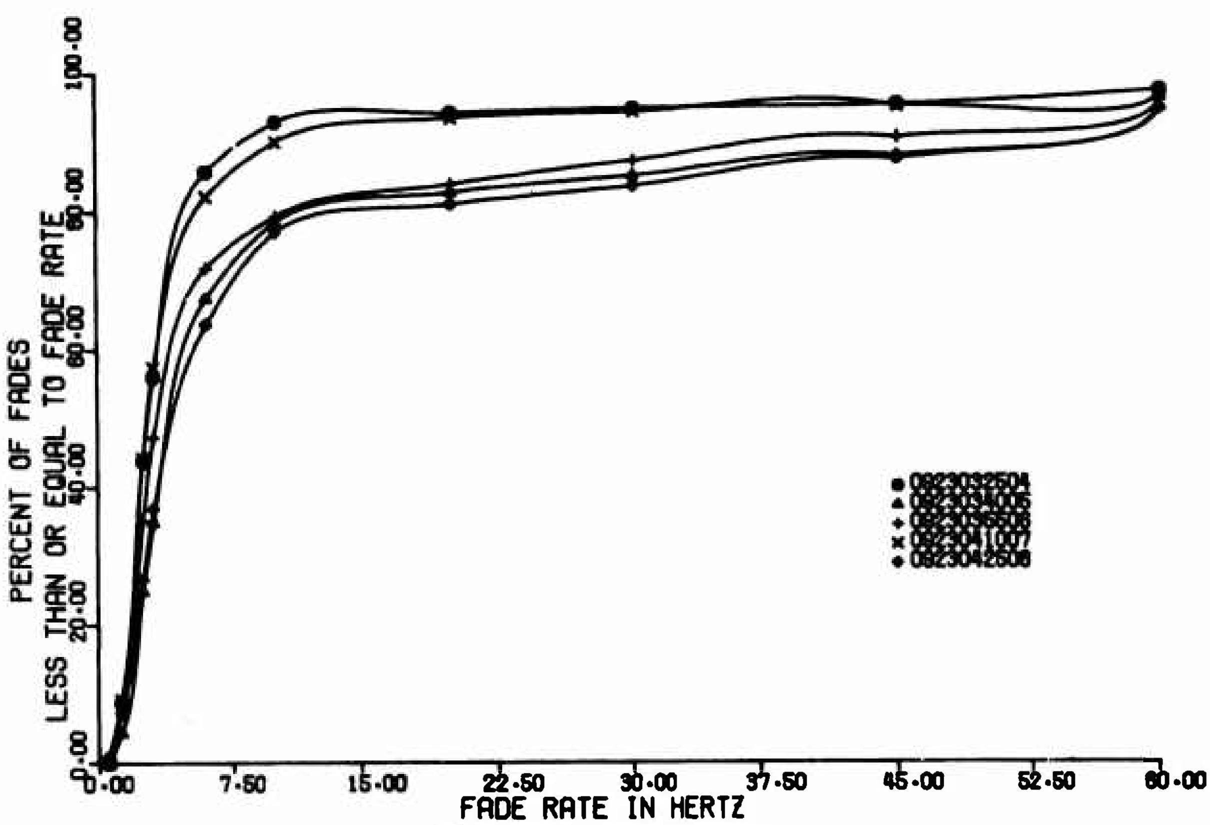


ENVELOPE CROSS CORRELATION COEFFICIENTS

POINT PETRE, SEPT

X-BAND, WIDE

Figure 374.

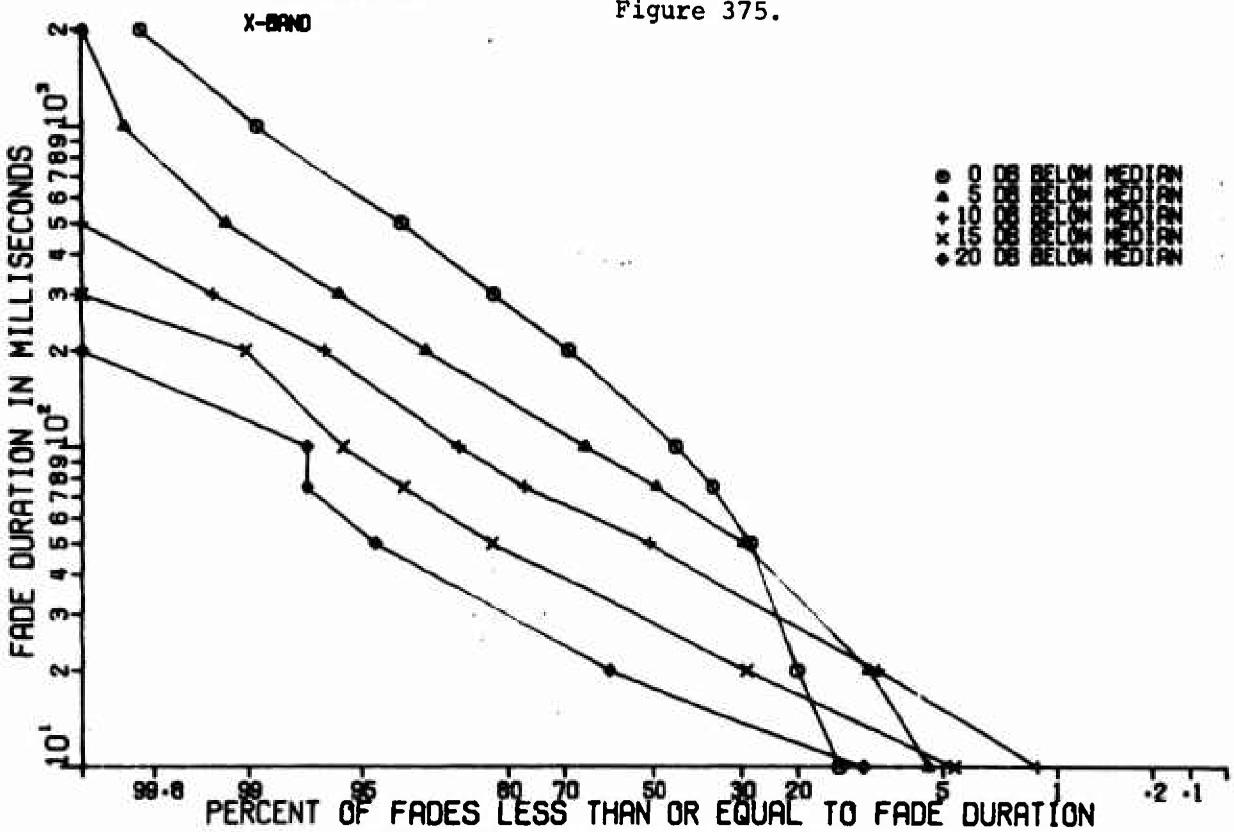


FADE RATE DISTRIBUTION

POINT PETRE, SEPT

X-BAND

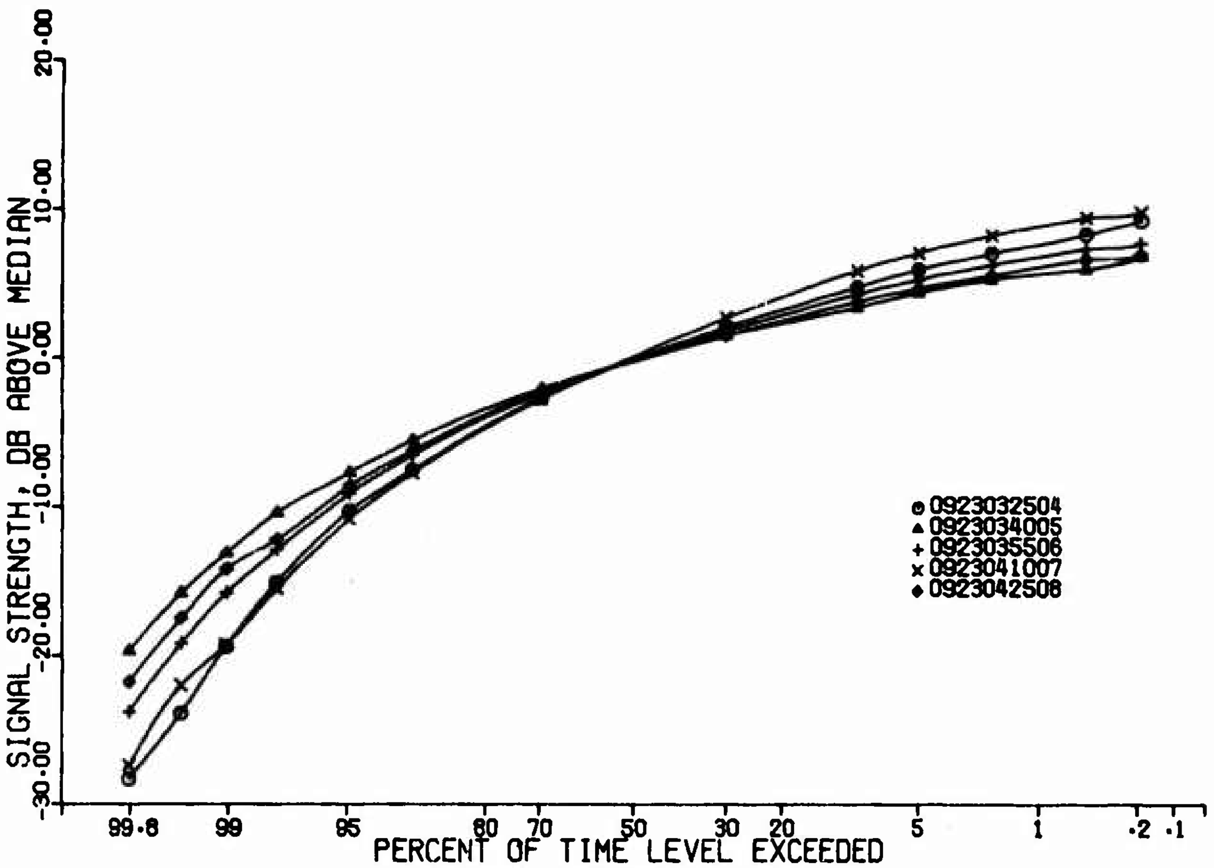
Figure 375.



DISTRIBUTION OF FADE DURATION

POINT PETRE, SEPT

X-BAND 0923-4 TO 8 Figure 376.

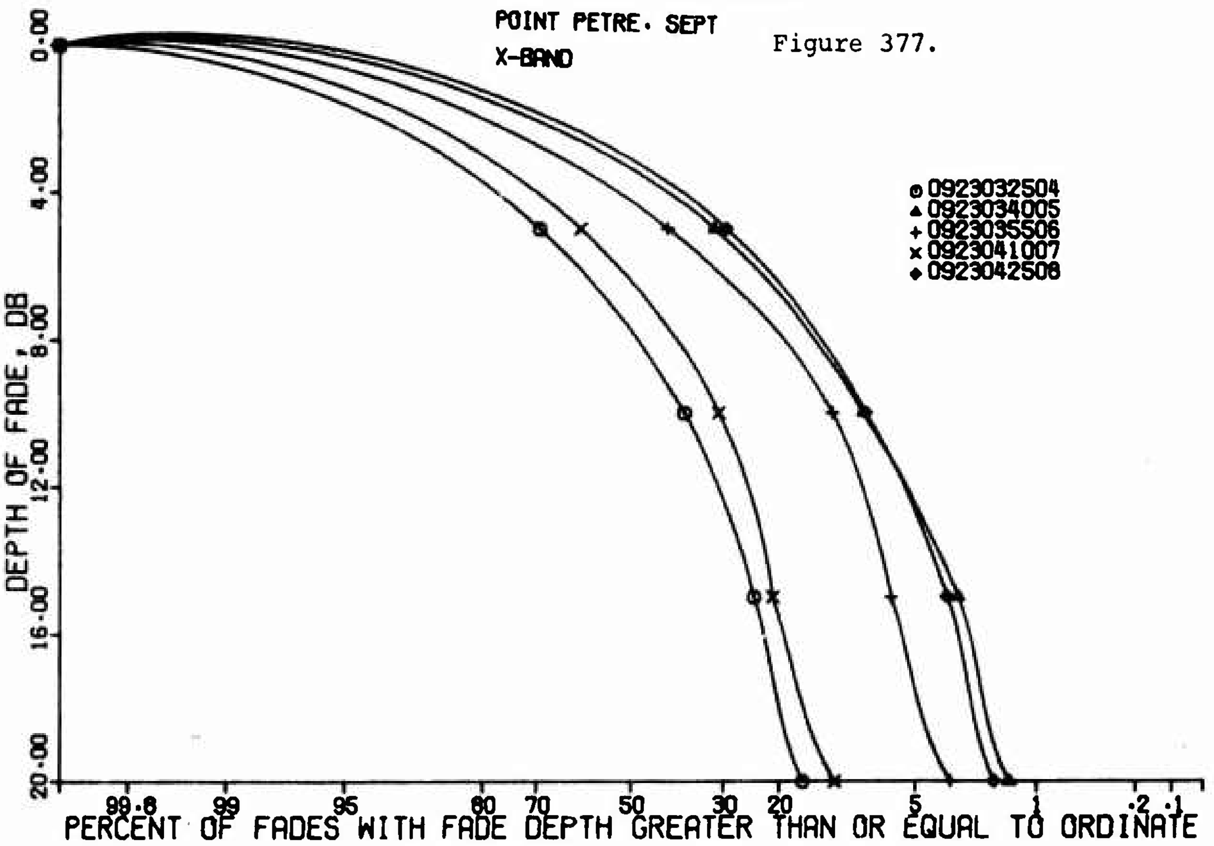


SIGNAL AMPLITUDE LEVEL

POINT PETRE, SEPT

X-BAND

Figure 377.



DISTRIBUTION OF DEPTH OF FADES

POINT PETRE, SEPT

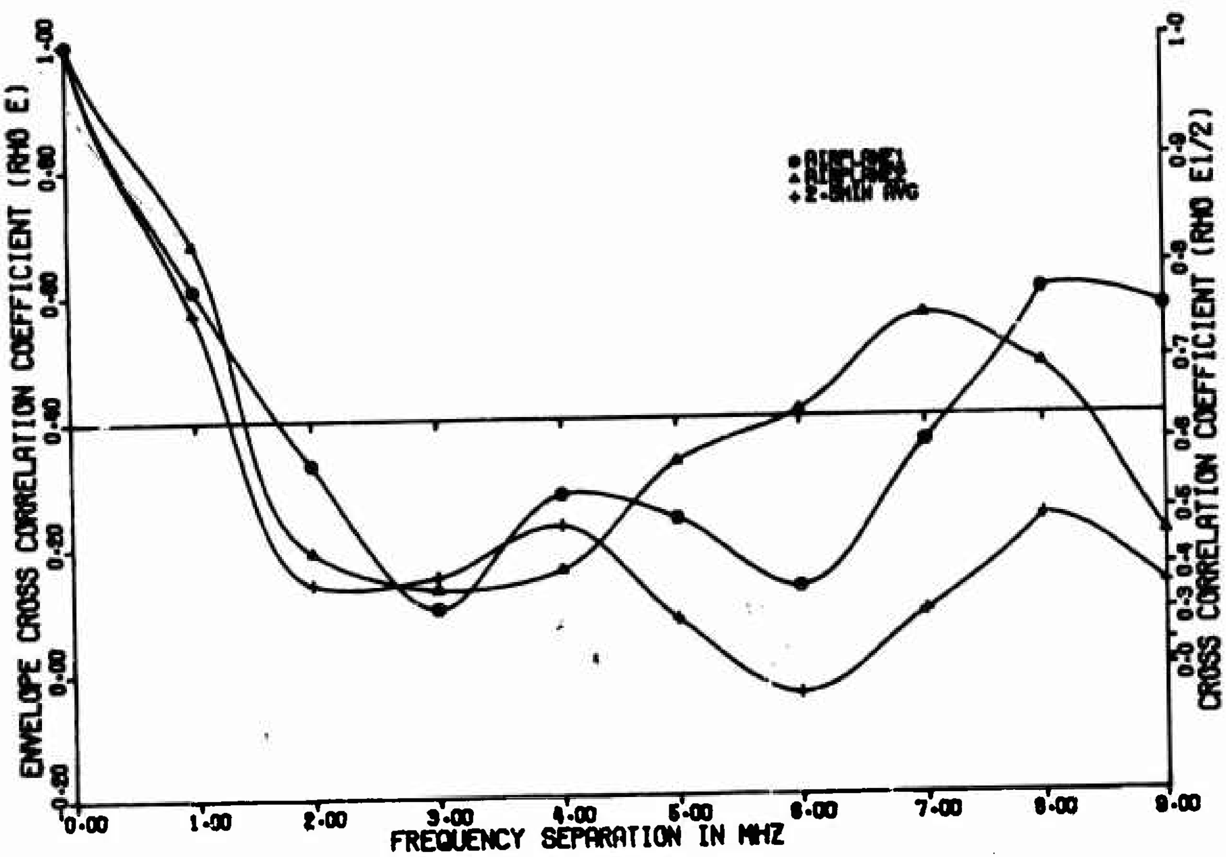
X-BAND

Figure 378.

2. Aircraft Effects

Aircraft effects should not be called an anomalous condition because it is a condition often present in both military and civilian environments. The presence of the aircraft for a short interval has very little effect on a statistical test of relatively long time duration. Figures 379 and 380 show the presence of the aircraft by the rise in correlation coefficient, but has little effect on the overall test. The fade rates shown in Figures 381 and 382 are averaged over the entire test number 15 and 13 respectively to indicate that the effect is noticeable over the entire test. During the time that the aircraft were actually present in the data, fade rates were much higher than shown on the curves.

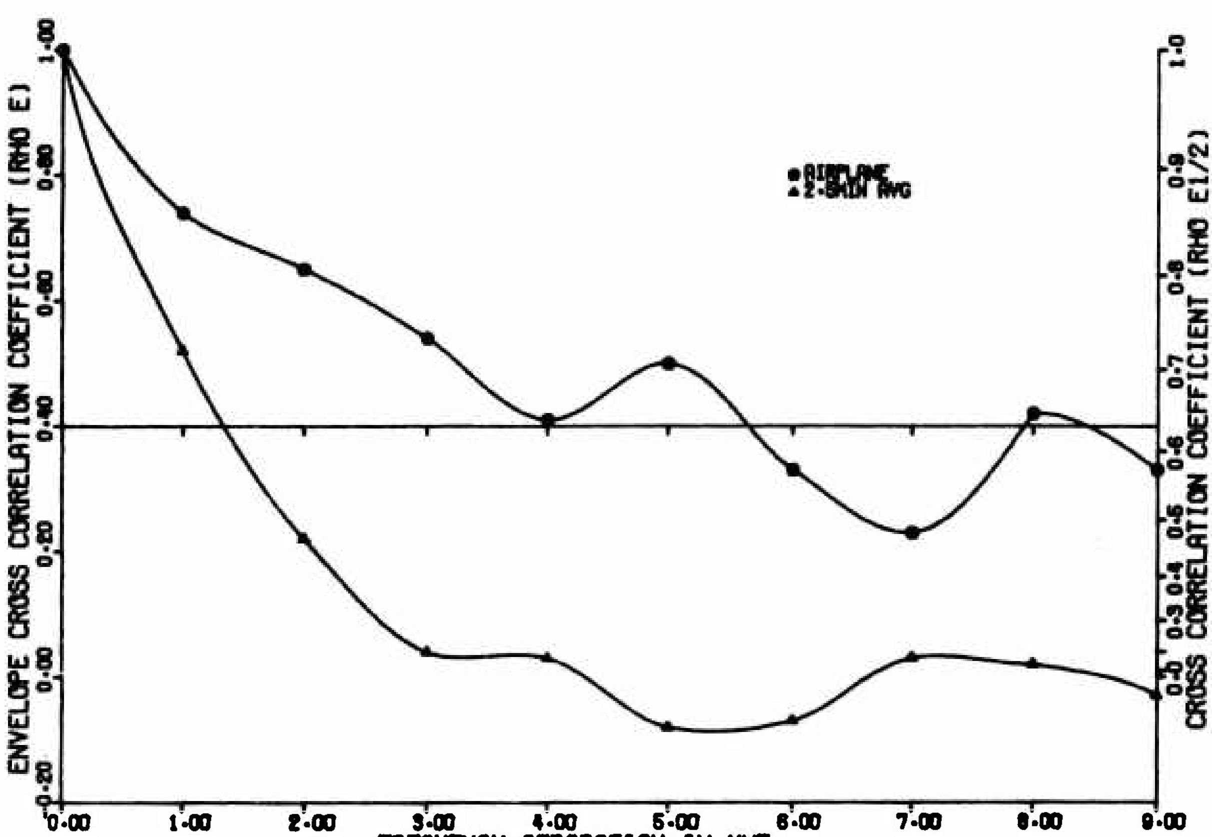
The frequency-time modems can operate through this type of environment. The adaptive frequency modems were previously found to have difficulty due to the high fade rates (Reference 21).



ENVELOPE CROSS CORRELATION COEFFICIENTS
ONTARIO CENTER, SUMMER
X-BAND WIDE AIRPLANE EFFECT 1

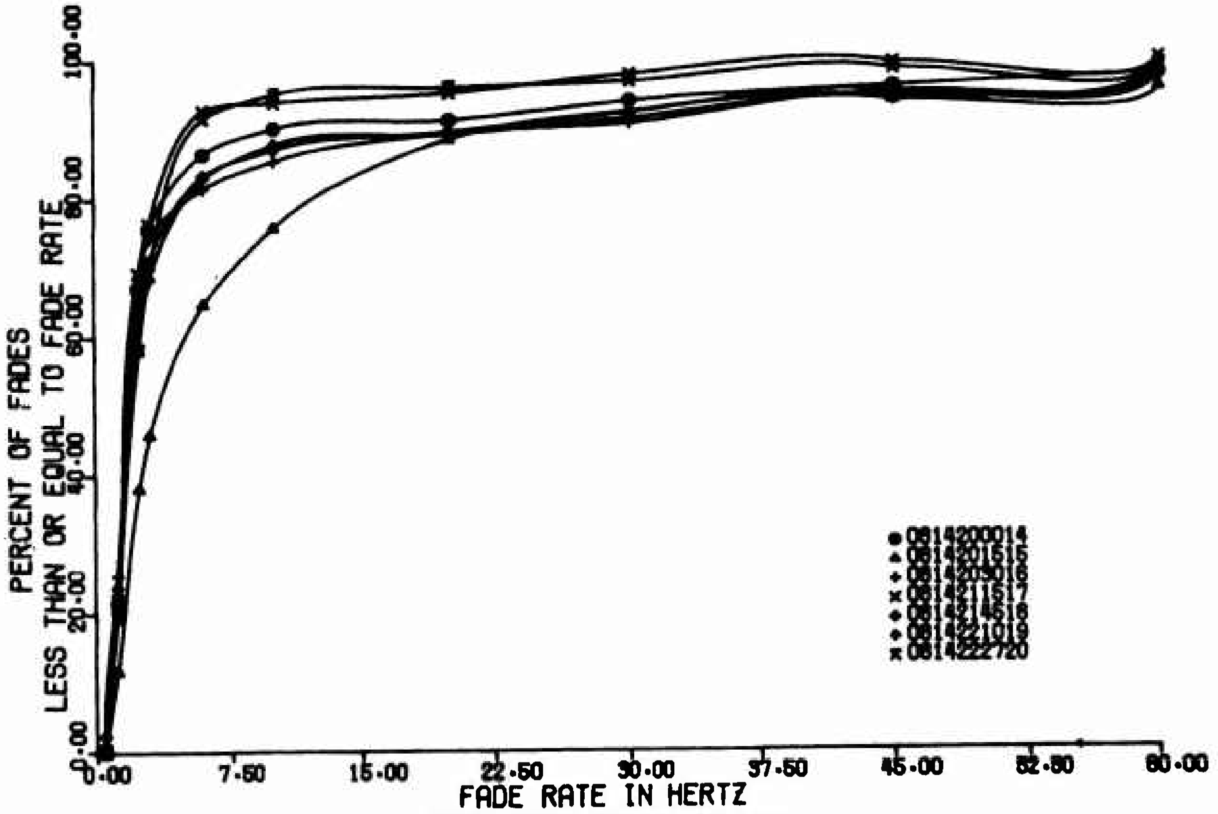
Figure 379.

The signatures of the aircraft presence are of interest because the resulting simultaneous C- and X-band AGC versus time curves are decidedly different. Figure 383 illustrates this phenomena clearly. The C-band signals receive interference first and this interference remains after the X-band interference has disappeared. This observation appears to be due to the combined effects of the wider antenna beamwidth and longer wavelength of the C-band signals which causes the aircraft to become illuminated prior to the X-band illumination with fades proportional to the wavelengths involved relative to the aircraft motion involved.



ENVELOPE CROSS CORRELATION COEFFICIENTS
ONTARIO CENTER, SUMMER
X-BAND, WIDE AIRPLANE EFFECT 2

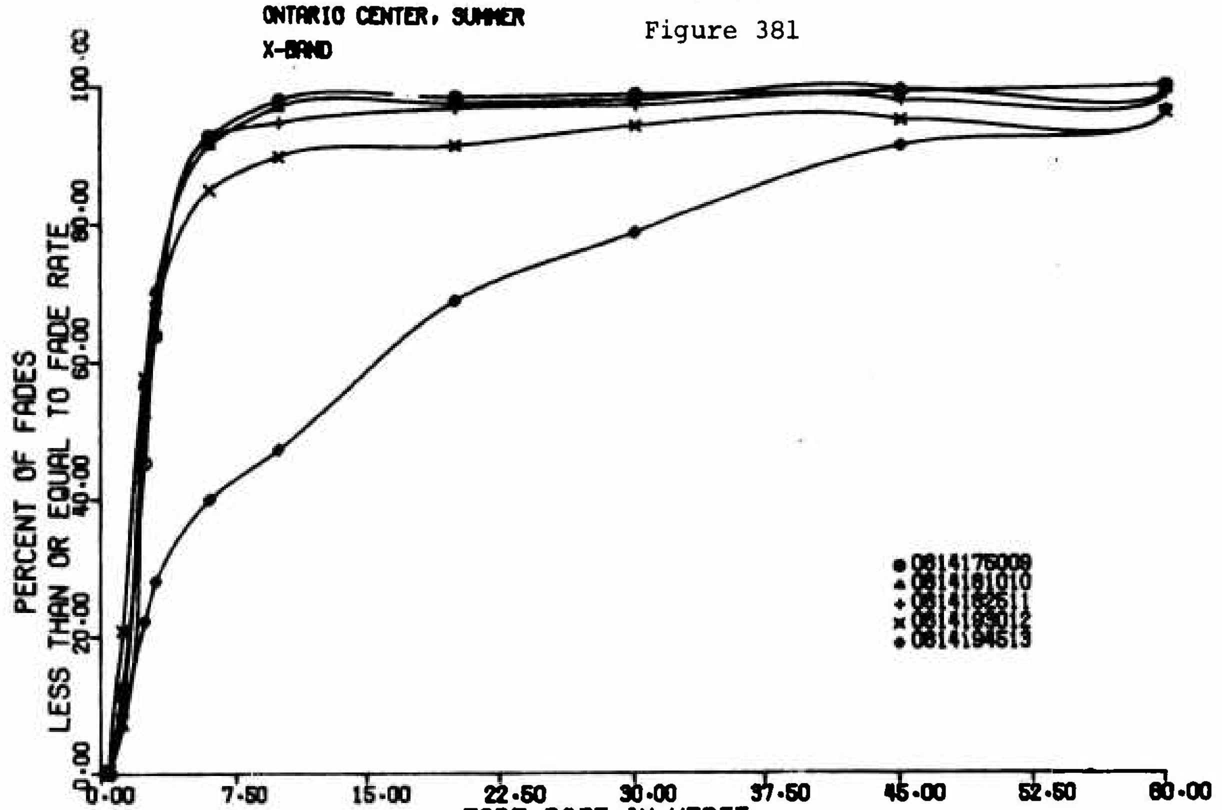
Figure 380.



FADE RATE DISTRIBUTION

ONTARIO CENTER, SUMMER
X-BAND

Figure 381



FADE RATE DISTRIBUTION

ONTARIO CENTER, SUMMER
X-BAND TEMPERATURE OVER 85

Figure 382.

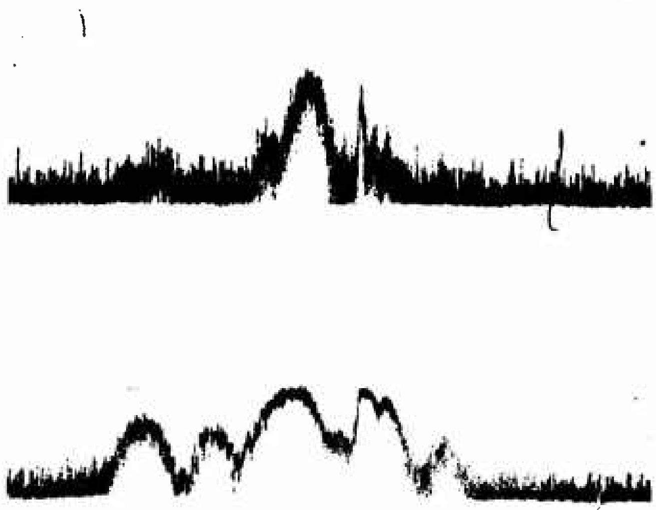
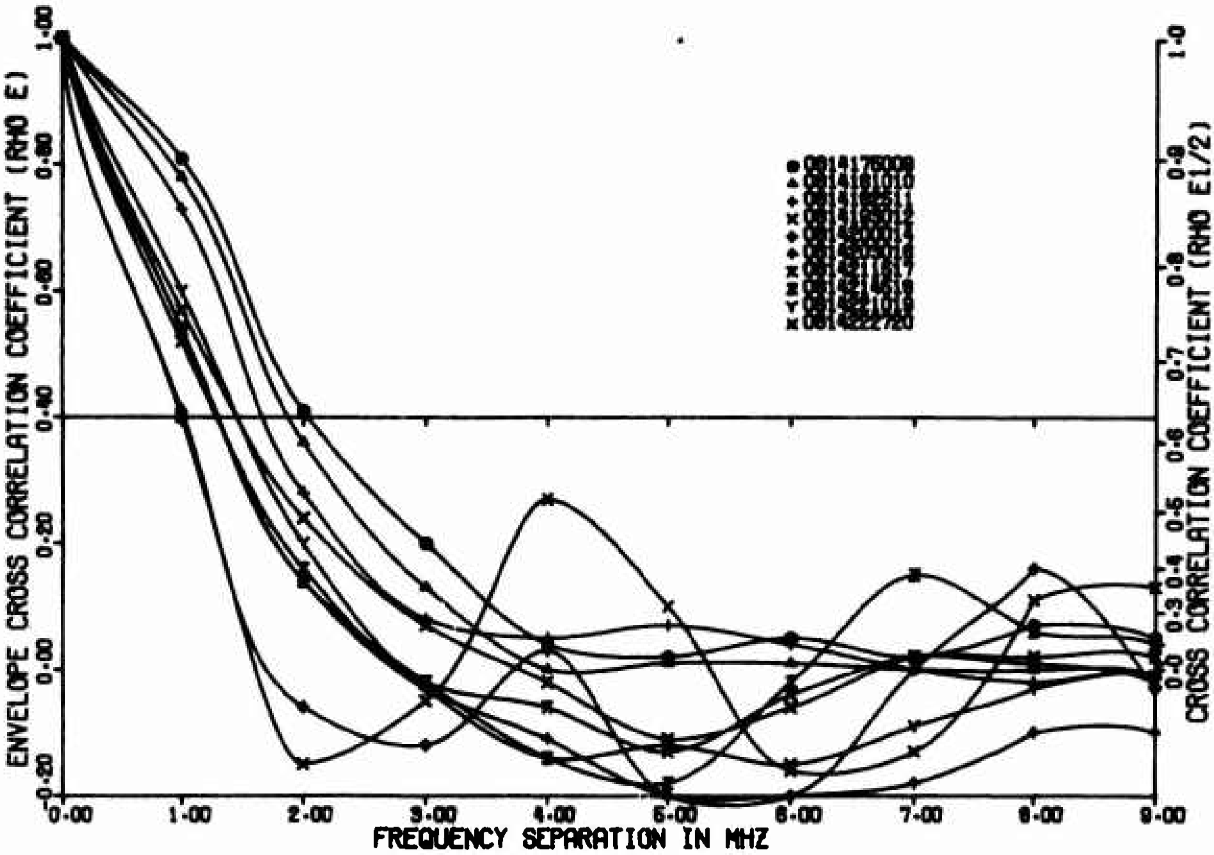


Figure 383. Simultaneous AGC Recording of Aircraft Effects in a Tropo Path During Test 02101430W

3. Unusual Shape in the Correlation Coefficient Curves

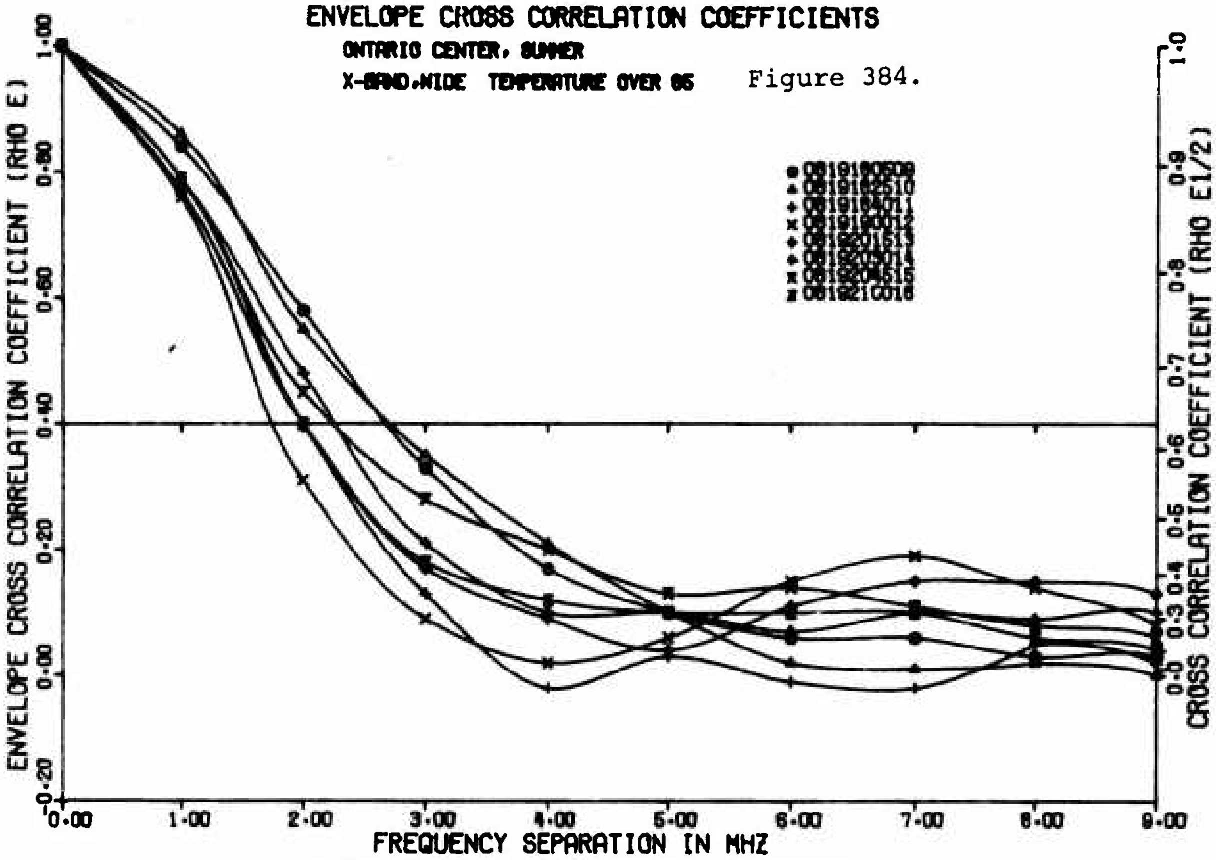
Some unusual shapes in the correlation coefficient curves were noted often enough to consider them as perhaps a part of the fading and multipath mechanism occasionally present in the common volume. This phenomenon was not observed in the previous troposcatter propagation work in Reference 21. If it were present, it went undetected. The correlation bandwidth curves are presented in Figures 384 and 385 because they might give a clue to the behavior of the common volume. The curves appear as if they are following some sort of (sin x)/x function. In Figure 384, it appears suddenly in test 12 at 1930 hours and gradually diminishes, changing its periodicity, over the several hours. The phenomenon is repeated to a lesser degree in Figure 385.



ENVELOPE CROSS CORRELATION COEFFICIENTS

ONTARIO CENTER, SUMMER

X-BAND, WIDE TEMPERATURE OVER 85 Figure 384.



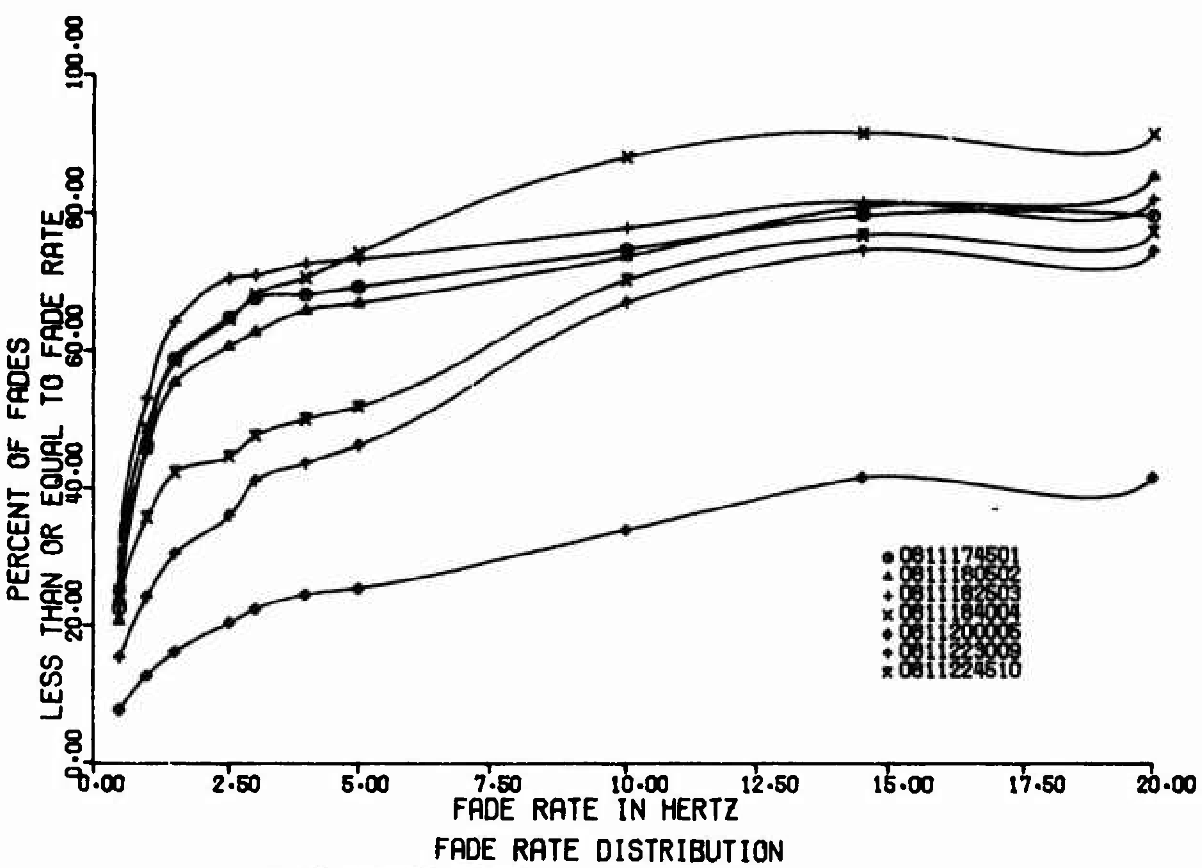
ENVELOPE CROSS CORRELATION COEFFICIENTS

ONTARIO CENTER, SUMMER

C-BAND, WIDE Figure 385.

4. High Fade Rates

Occasionally very high fade rates were observed. As discussed in a subsequent section, these could have some effect on adaptive frequency modems. Figures 386 and 387 are examples of some of the very high fade rates. These high fade rates render the best frequency select circuits to be spoofed and to cause the adaptive frequency modem to go to a less than optimum frequency. Sometimes this can cause an error in the received frequency commands and can cause the link to become broken.

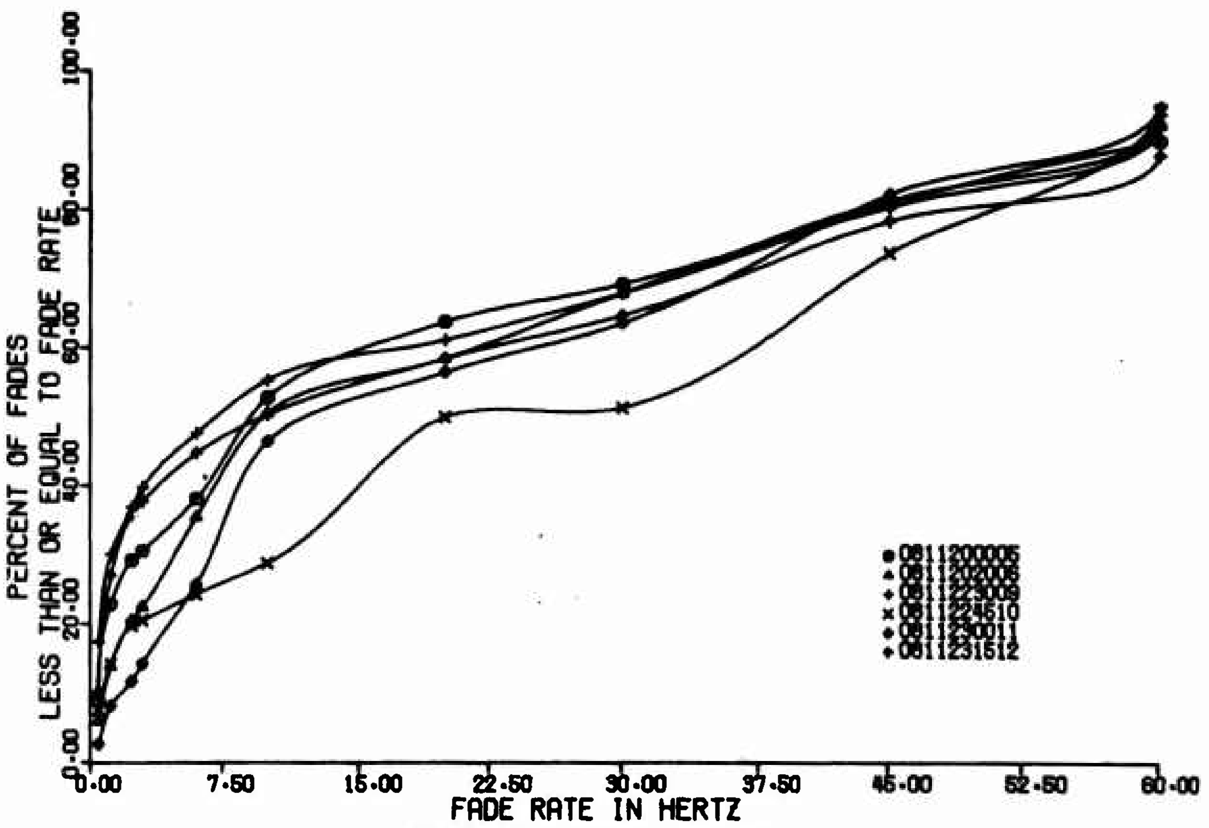


FADE RATE DISTRIBUTION

ONTARIO CENTER, SUMMER

C-BAND

Figure 386.



FADE RATE DISTRIBUTION

ONTARIO CENTER, SUMMER

X-BAND

5. Effects of Cloud Ceiling on Troposcatter

It was observed in the field that the ceiling seemed to affect the received signal strength. Weather data was examined to find days with all meteorological data remaining relatively constant except the ceiling. Two such days were found and plots of signal strength versus ceiling and correlation bandwidth versus ceiling are shown in Figures 388 and 389, respectively. The signal strength versus ceiling data indicated that as the ceiling height increased the signal strength increased until the ceiling was equal to or slightly greater than the intersection of the lower rays and then began to decrease as the ceiling height continued to rise. The correlation bandwidth versus ceiling data indicated that the correlation bandwidth was wide when the ceiling was low and narrow when the ceiling was high. The plot was similar to a hyperbolic function with the knee of the curve occurring at the altitude of the intersection of the lower rays.

These observations are by no means to be considered as conclusive at this time, for the quantity of data used in the observations is insufficient. They are, however, very interesting observations and might be considered for further study in the future.

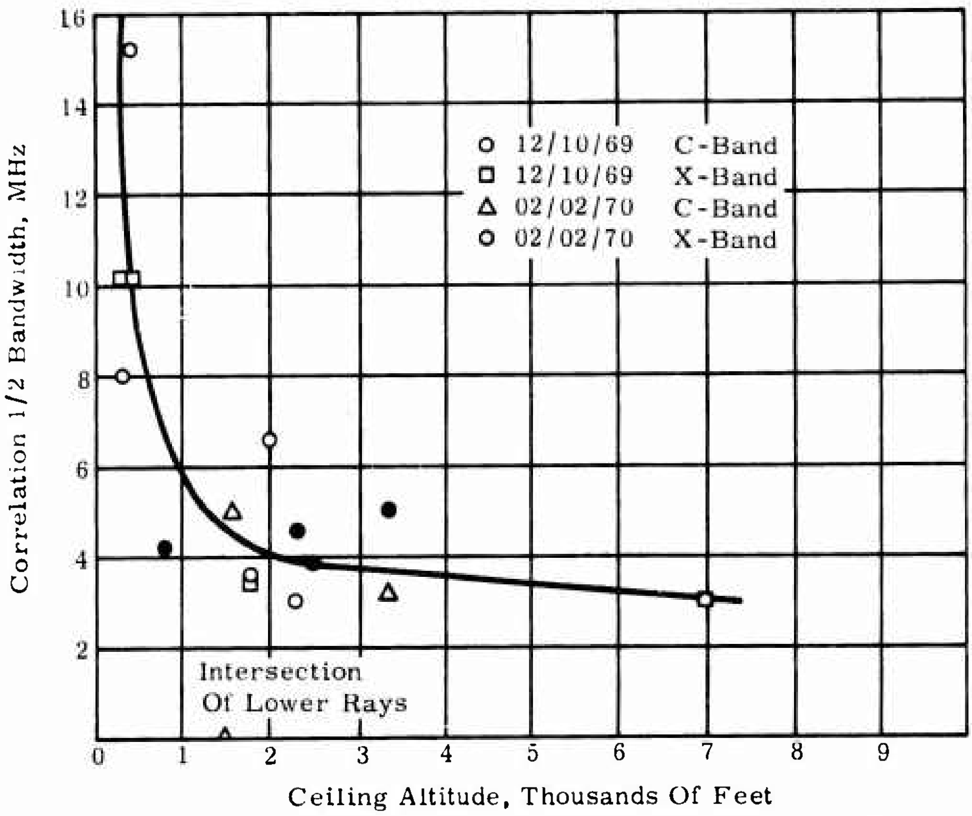


Figure 388. Correlation Bandwidth versus Ceiling Height

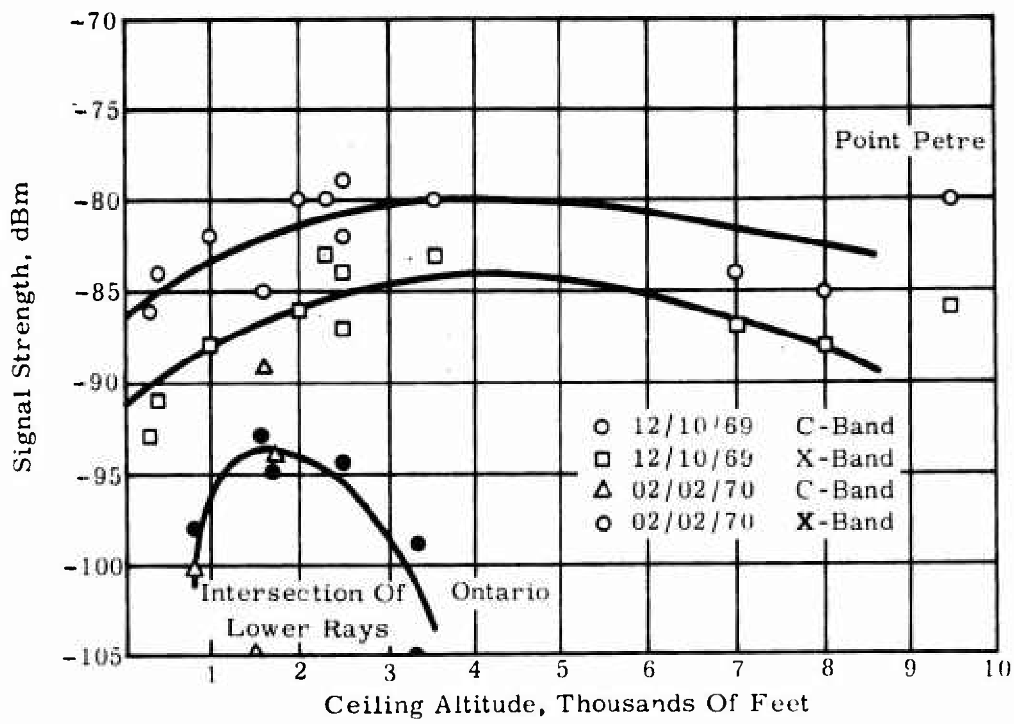


Figure 389. Signal Strength versus Ceiling

Figures 390 through 406 summarize the troposcatter characteristics observed over the Tobyhanna, Pennsylanvia to Hexagon, Fort Monmouth, New Jersey link in the period February through July, 1968. These tests were made at C-band and employed, for most of the test period, 10 foot parabolic antennas at both the transmitter and receiver. Full details of the link and the observations are given by Branham et al. in "Troposcatter Transmission of High Speed Digital Signals" (reference 21). In brief, this link may be described as a 94 mile path over predominantly mountainous terrain which becomes coastal near the New Jersey termination. The scatter angle is 0.674 degrees which is smaller than that of any other path tested in this program.

The figures follow the same nomenclature used in presenting the preceding results and are included primarily for reference purposes. It is seen that the median correlation bandwidth for all data is approximately 4.4 MHz (Figure 390). This is approximately 1 to 2 MHz wider than the median correlation bandwidths observed in the N. Y. paths. The wide correlation bandwidth implies a smaller multipath spread and therefore hints that the effective beamwidth over this link was still less than the actual (the model of Section II using equation 43 would set the effective beamwidth equal to the actual beamwidth for this scatter angle). The fade rates (Figure 404) are, however, comparable to those observed here.

H. DATA FROM TOBYHANNA/HEXAGON PATH (PREVIOUS PROGRAM)

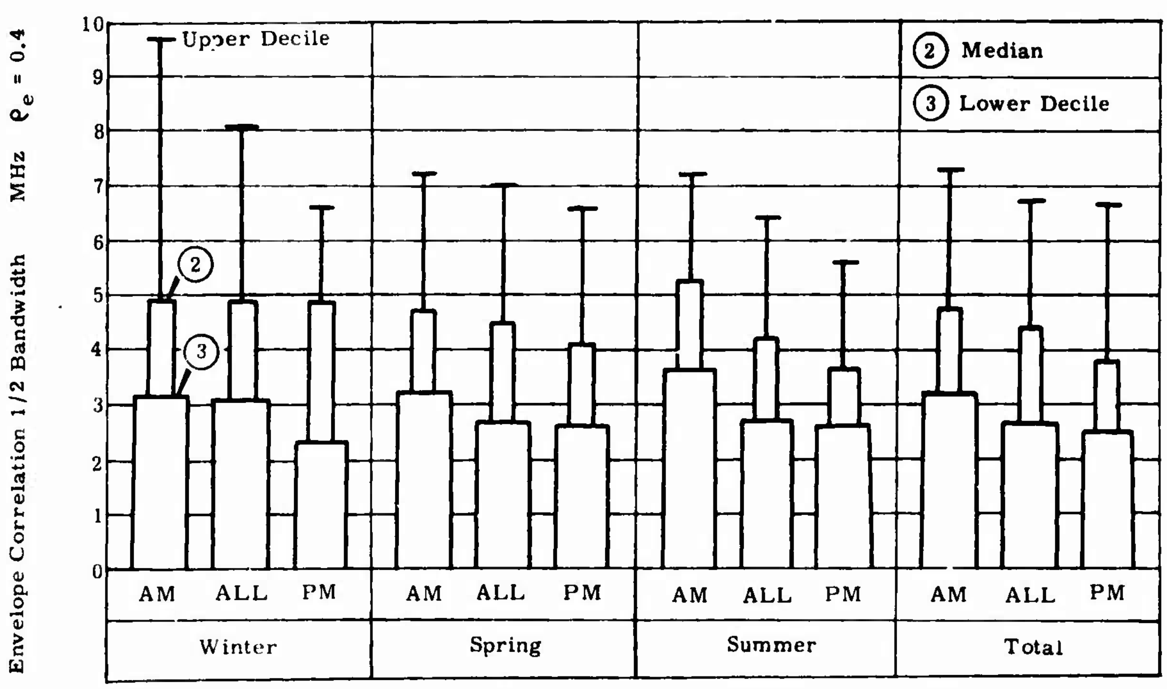


Figure 390. Seasonal and Diurnal Effects on Cross-correlation Coefficient

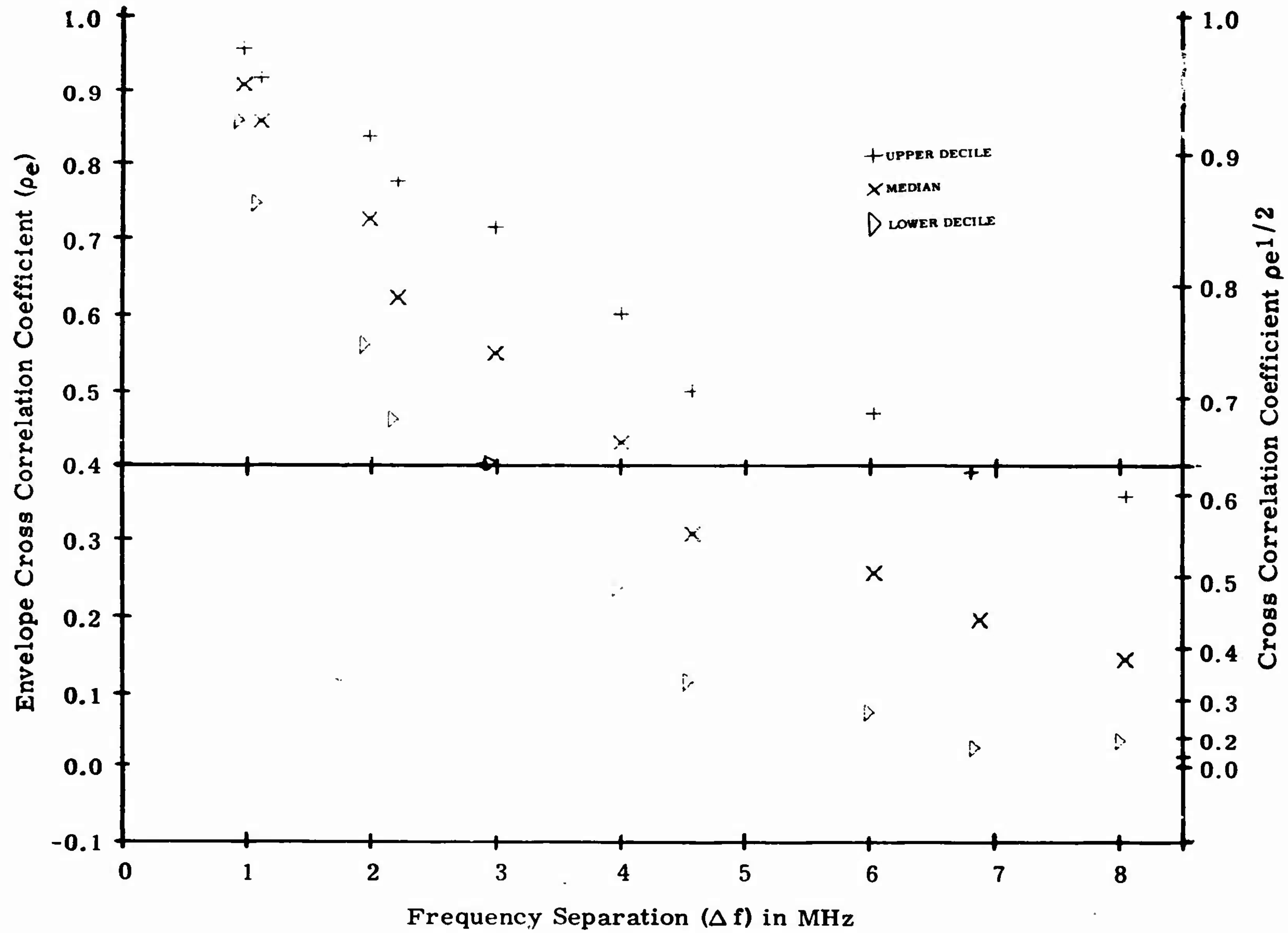


Figure 391. Envelope Cross-correlation Coefficients, Entire Program (ALL) 682 Tests

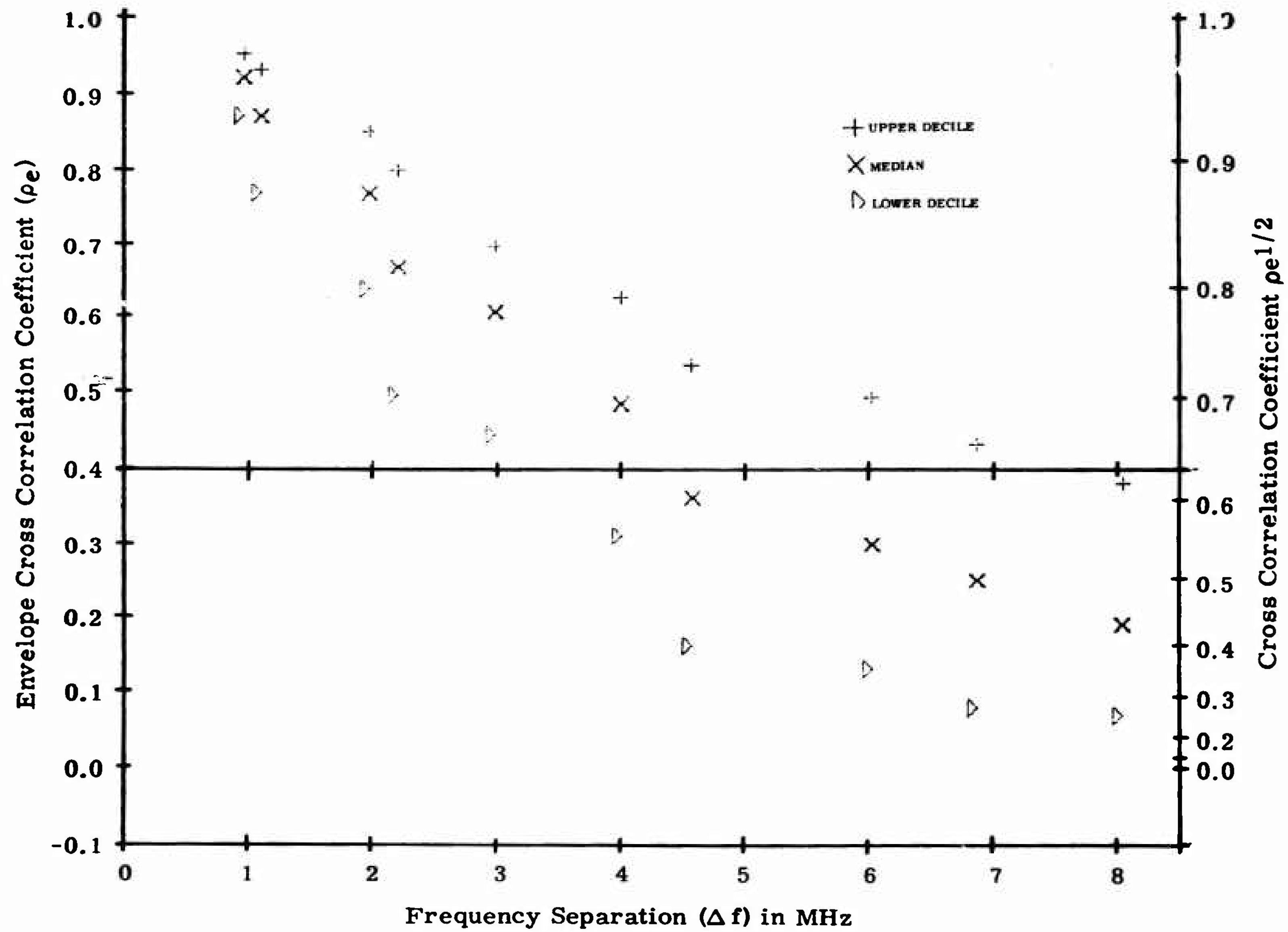


Figure 392. Envelope Cross-correlation Coefficients, Entire Program (AM) 297 Tests

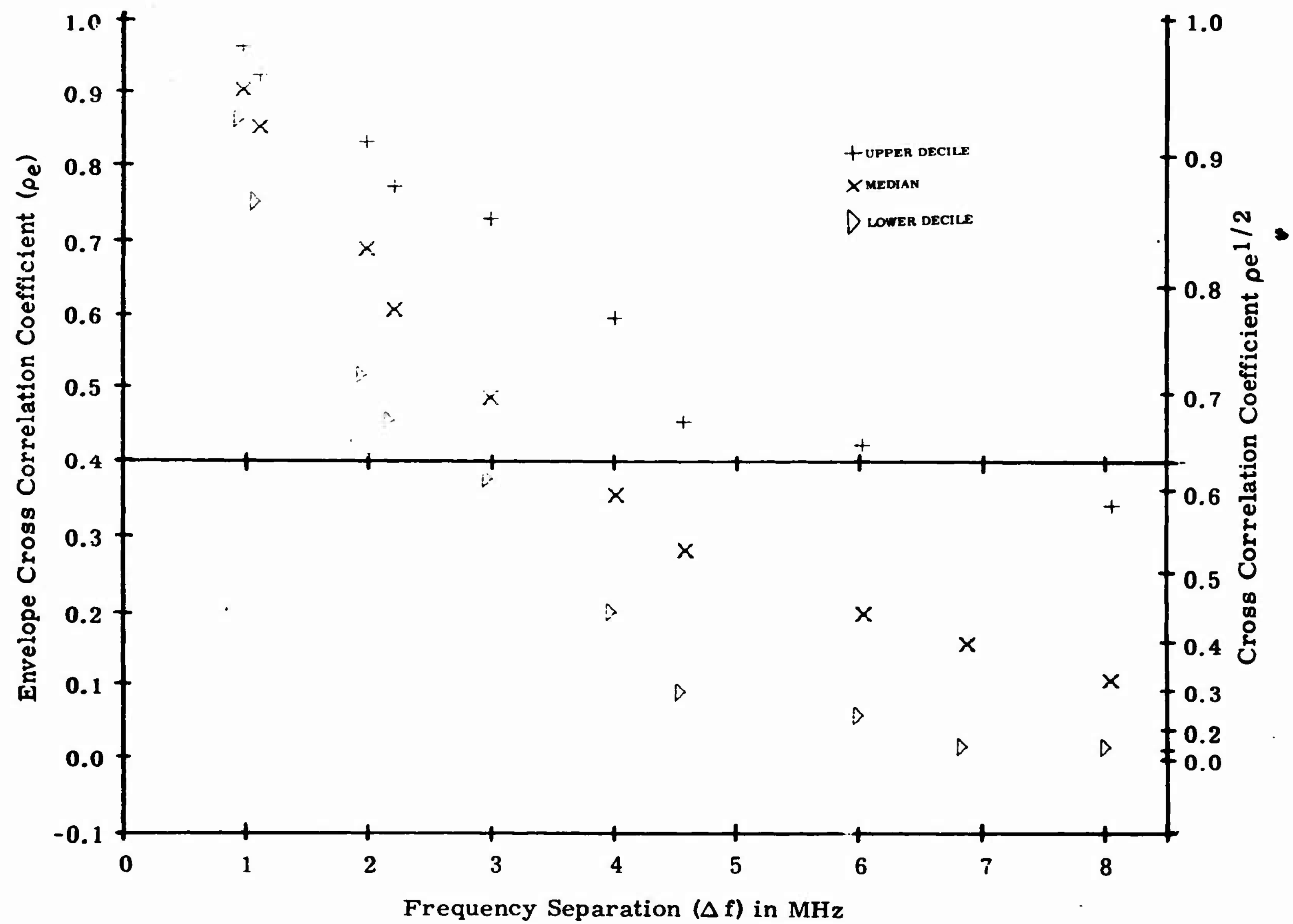


Figure 393. Envelope Cross-correlation Coefficients, Entire Program (PM) 385 Tests

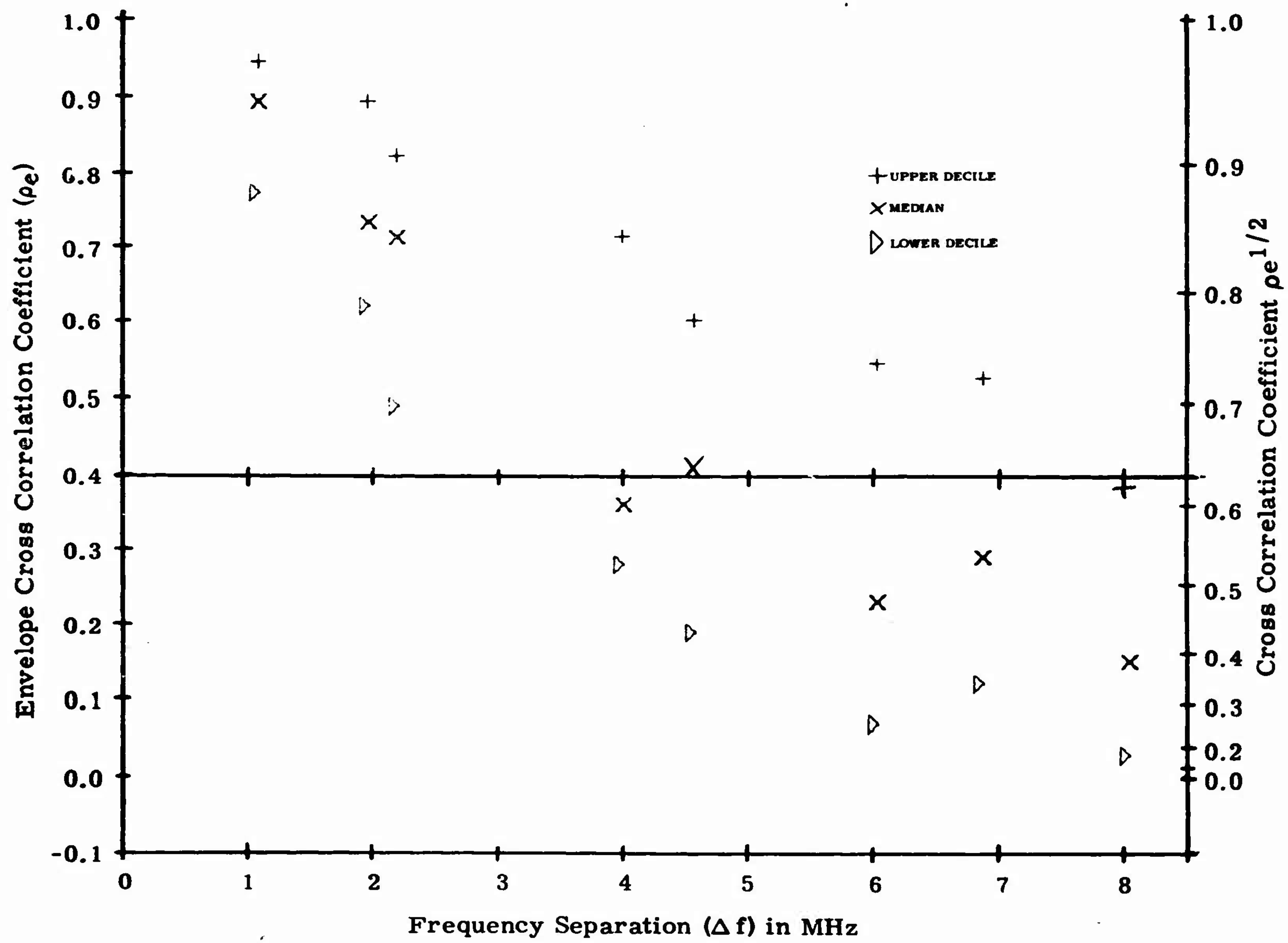


Figure 394. Envelope Cross-correlation Coefficients, Winter (ALL) 79 Tests

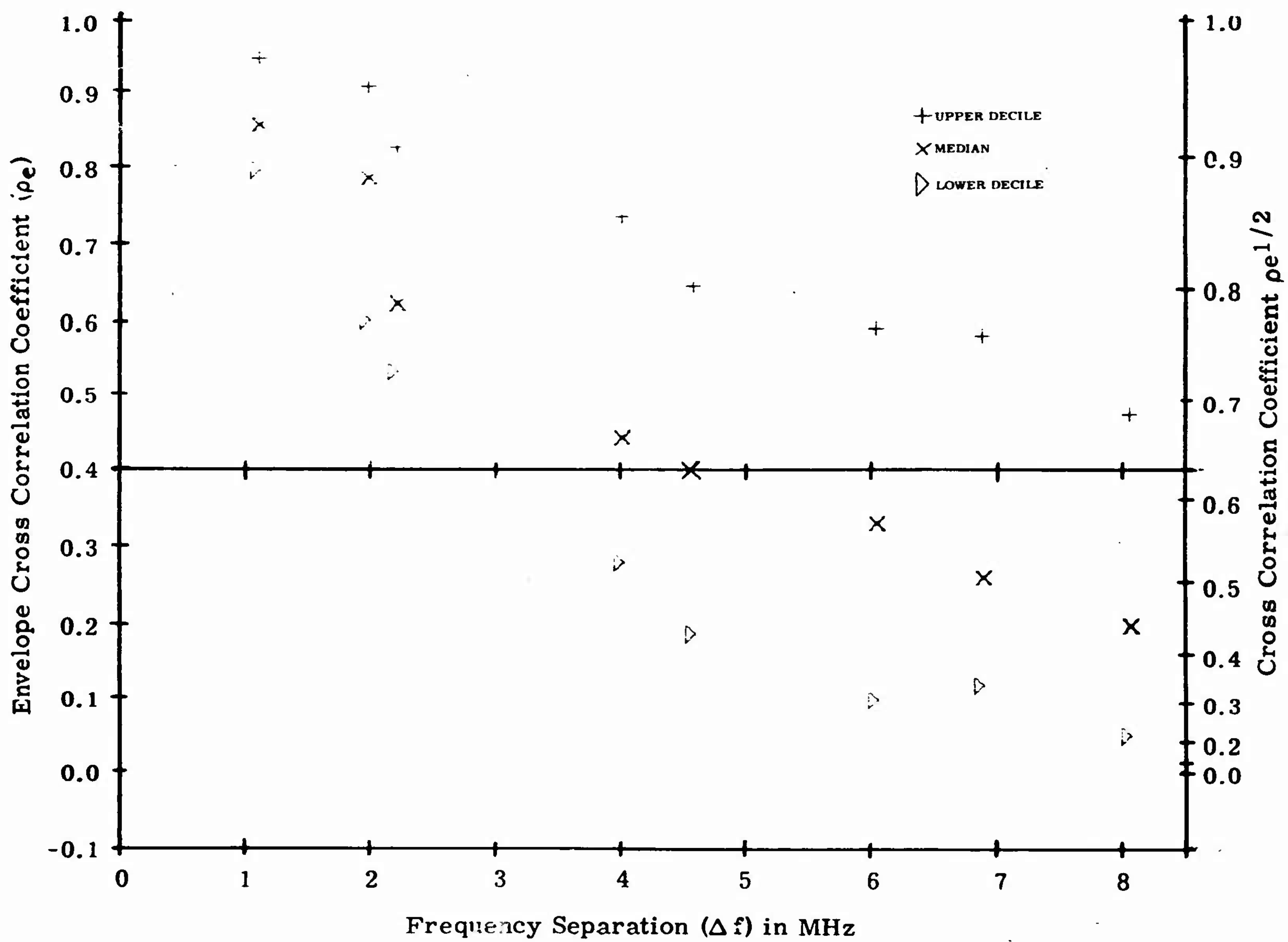


Figure 395. Envelope Cross-correlation Coefficients, Winter (AM) 45 Tests

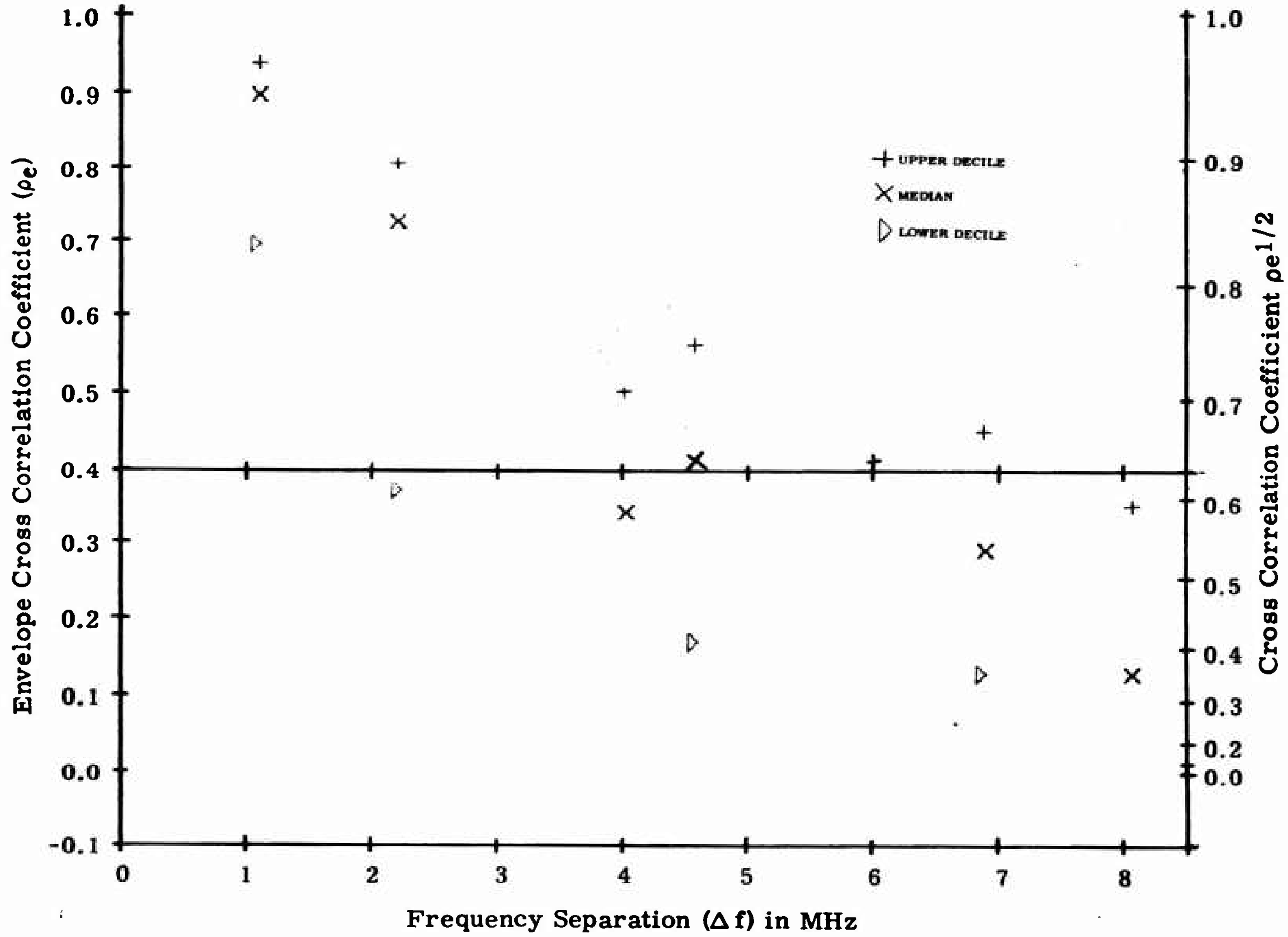


Figure 396. Envelope Cross-correlation Coefficients, Winter (PM) 34 Tests

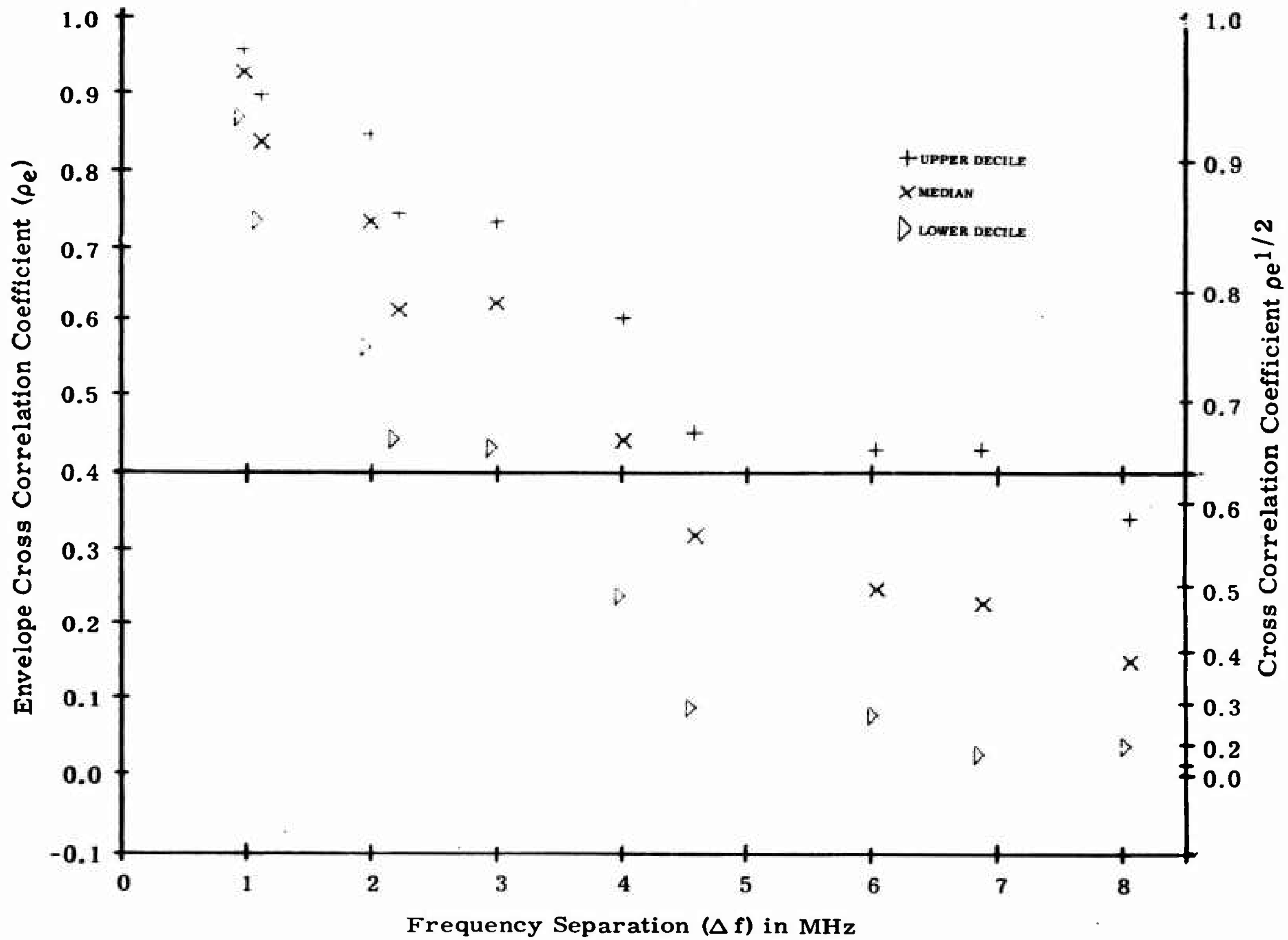


Figure 397. Envelope Cross-correlation Coefficients, Spring (ALL) 328 Tests

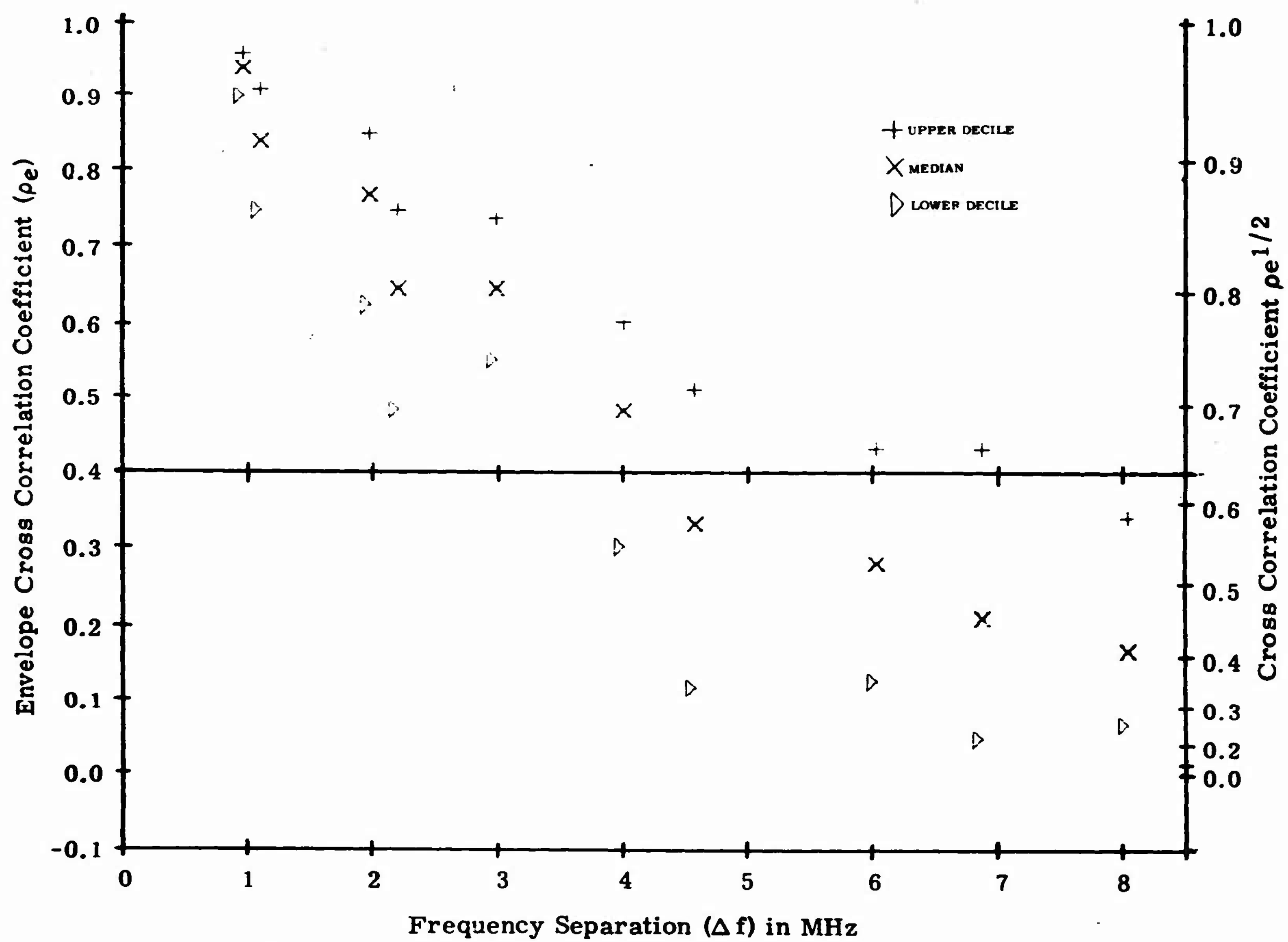


Figure 398. Envelope Cross-correlation Coefficients, Spring (AM) 142 Tests

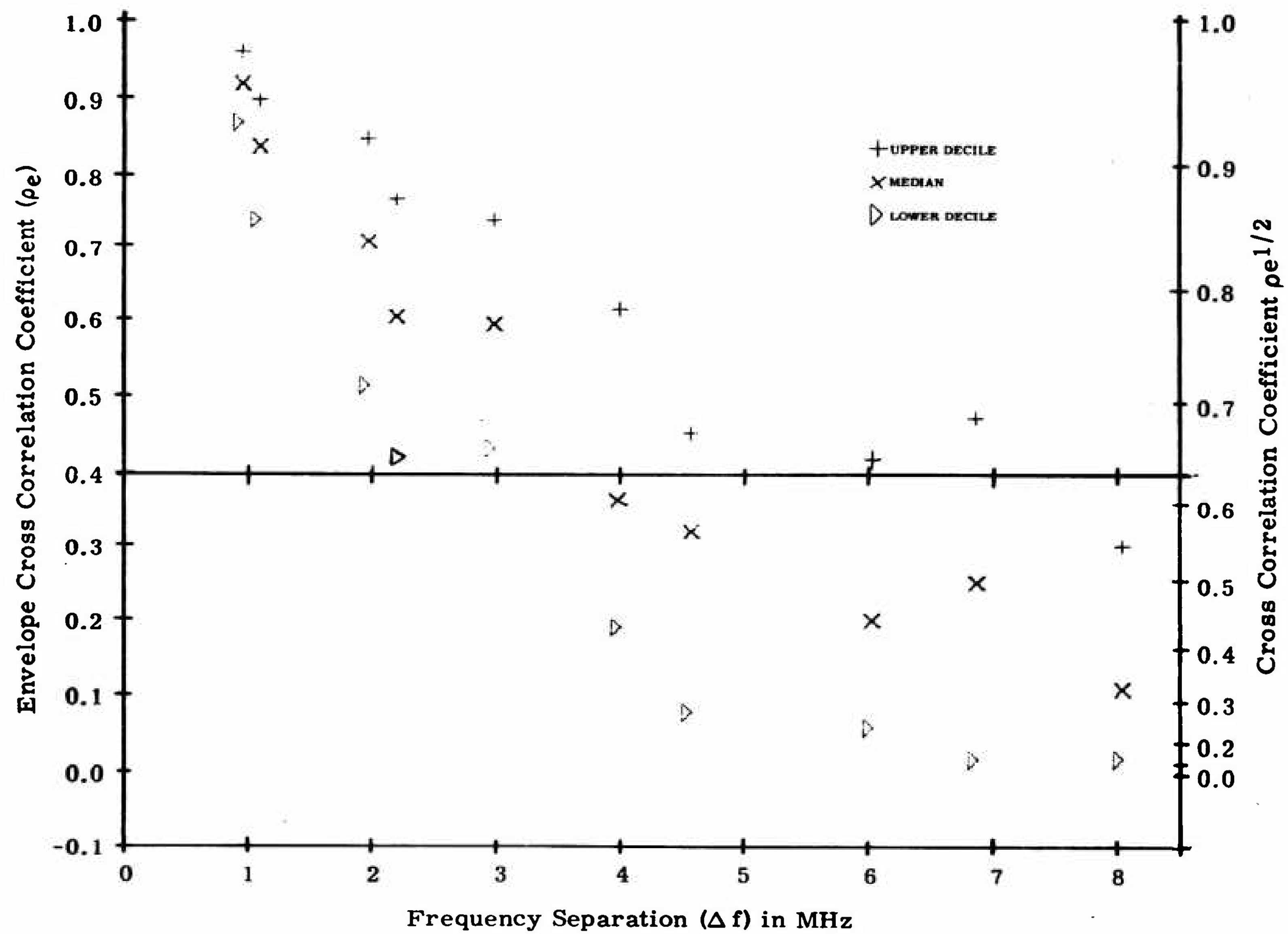


Figure 399. Envelope Cross-correlation Coefficients, Spring (PM) 186 Tests

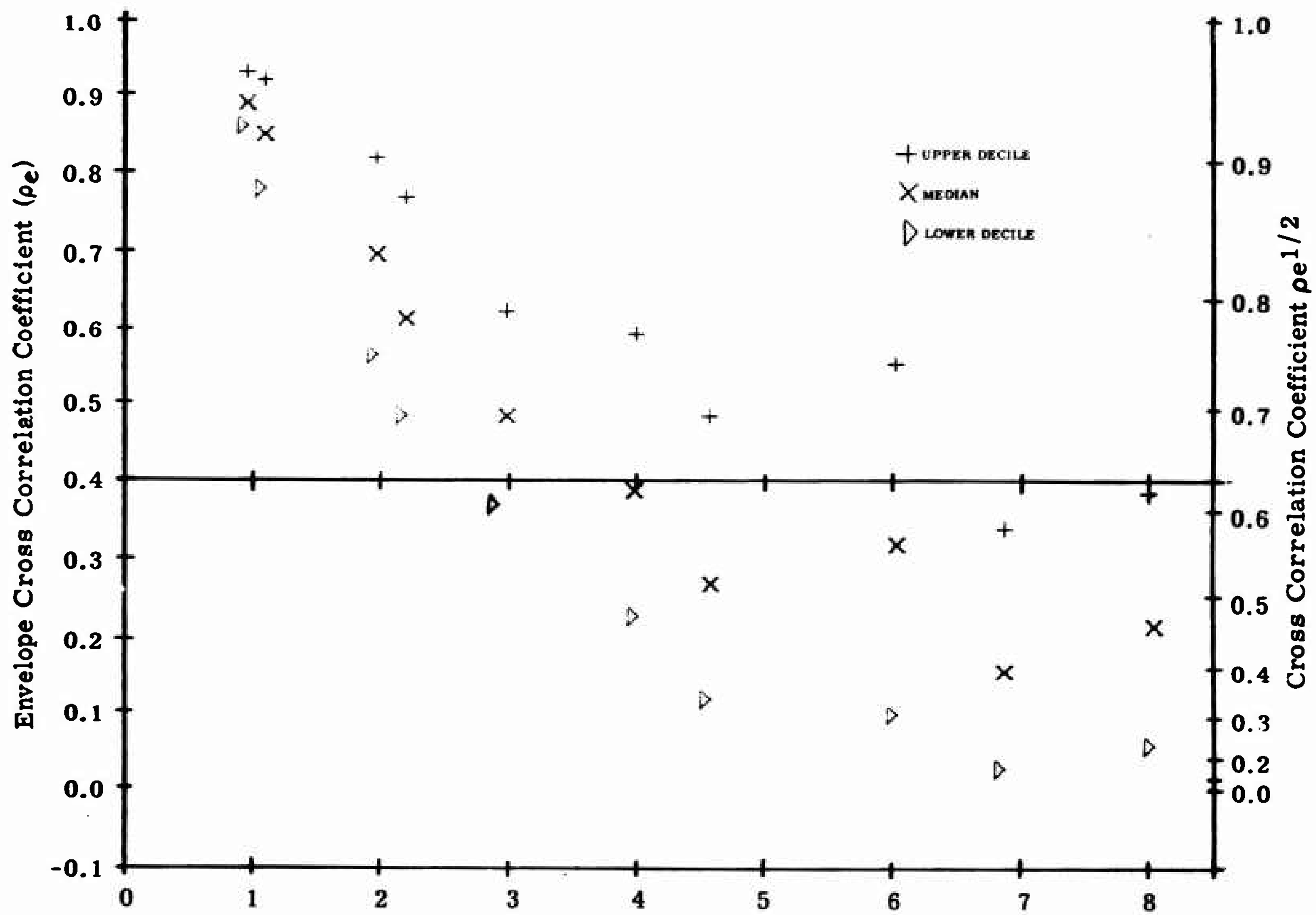


Figure 400. Envelope Cross-correlation Coefficients, Summer (ALL) 275 Tests

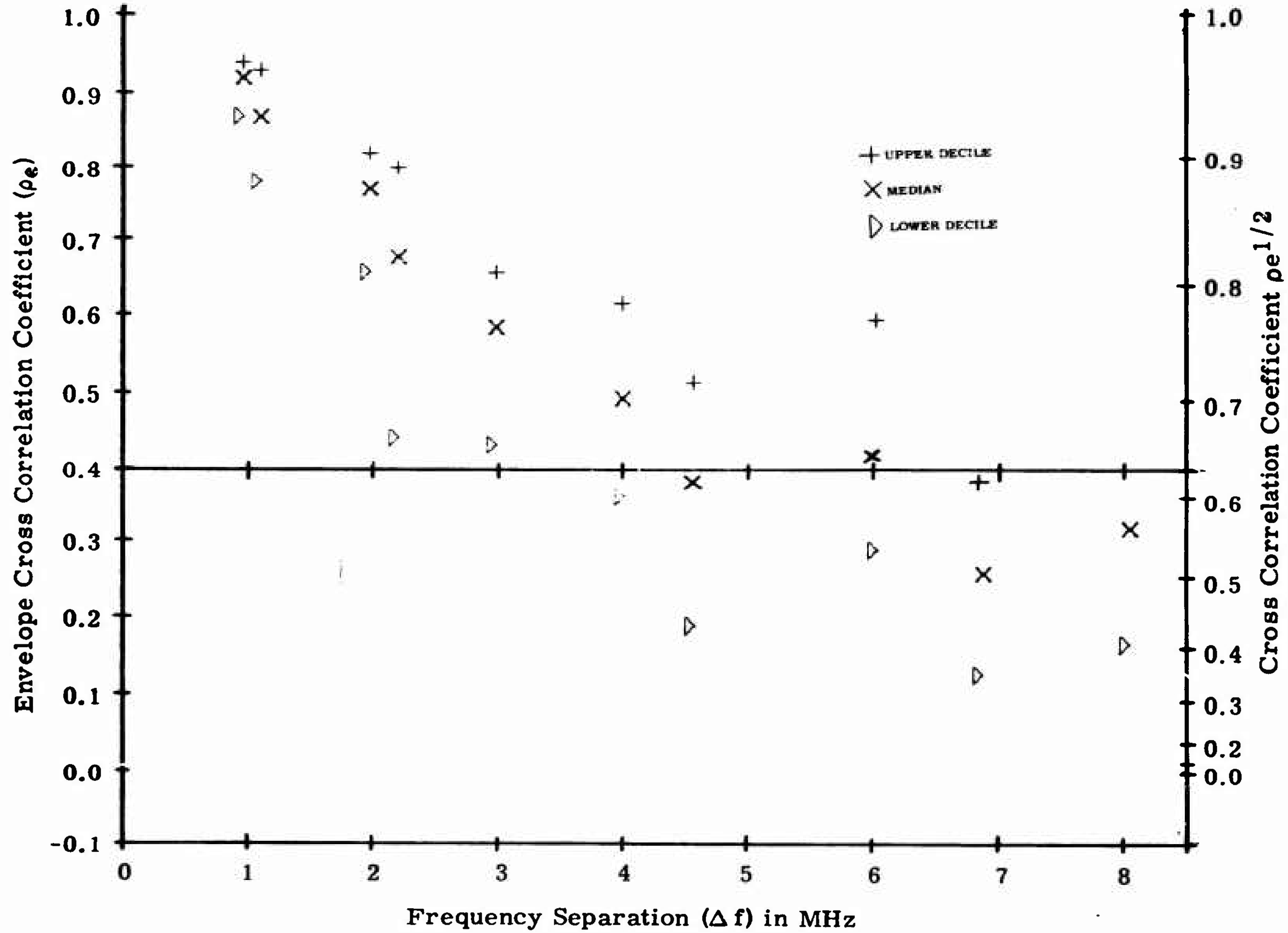


Figure 401. Envelope Cross-Correlation Coefficients, Summer (AM) 110 Tests

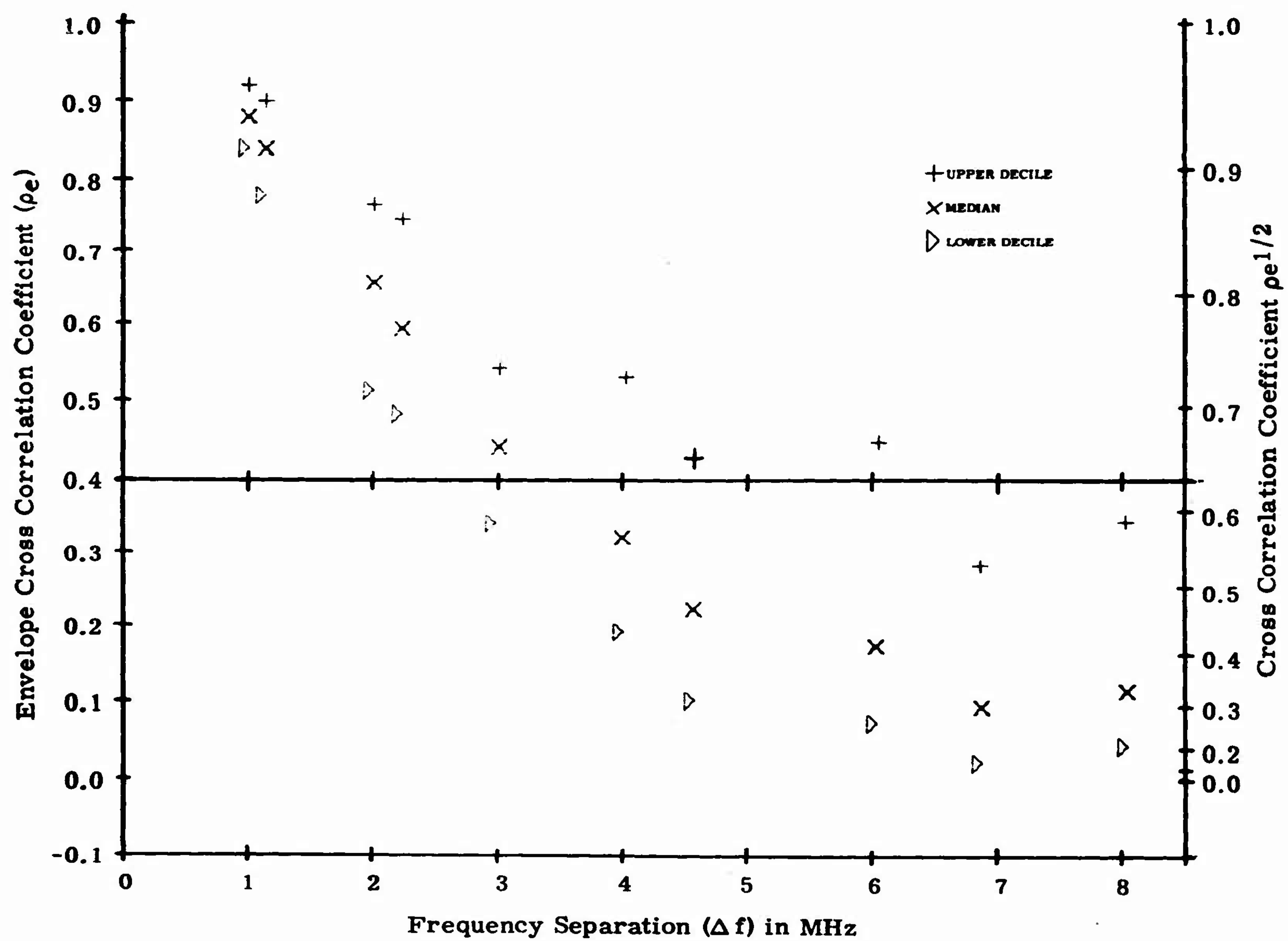


Figure 402. Envelope Cross-correlation Coefficients, Summer (PM) 165 Tests

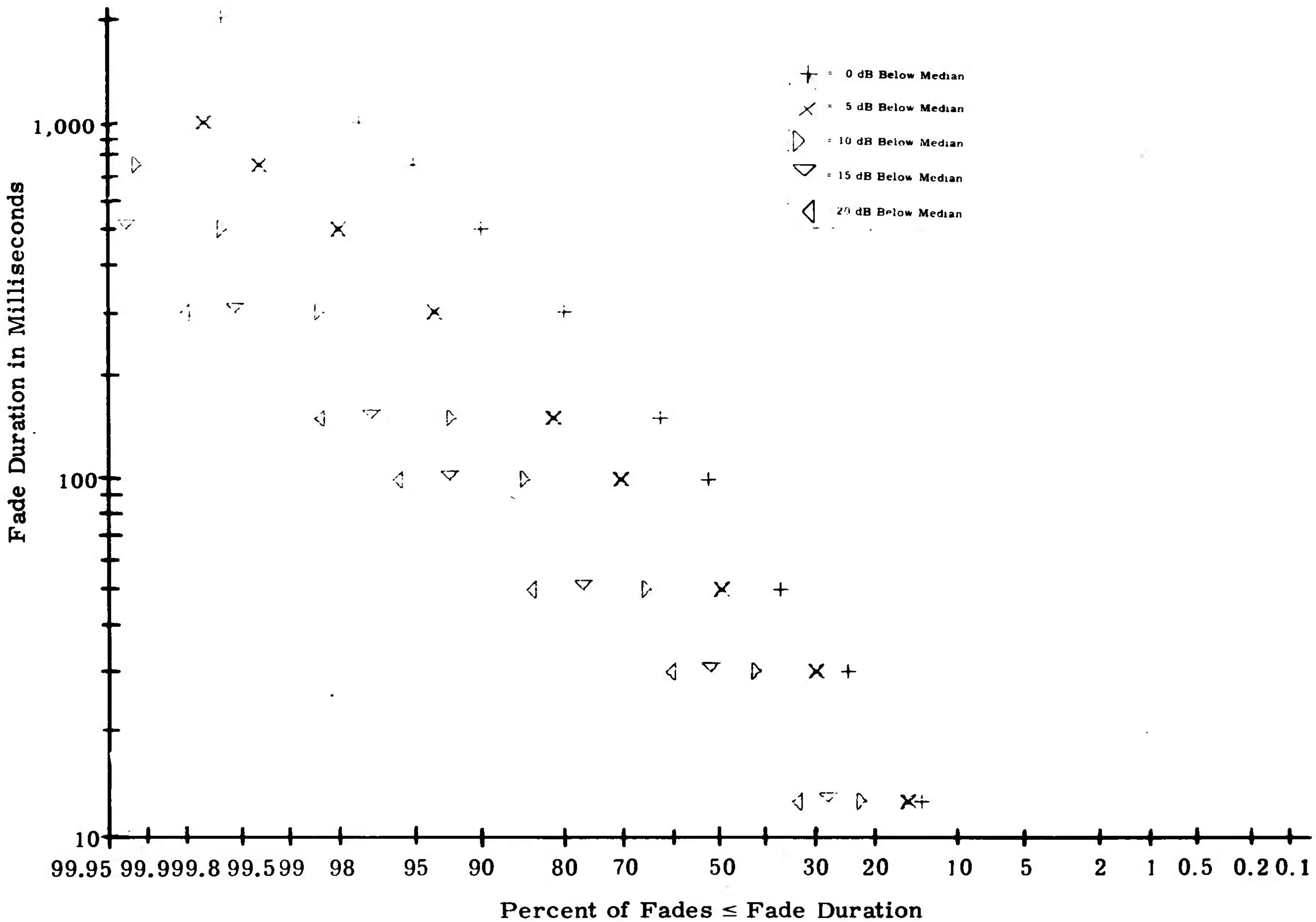


Figure 403. Fade Duration Distribution, Entire, ALL

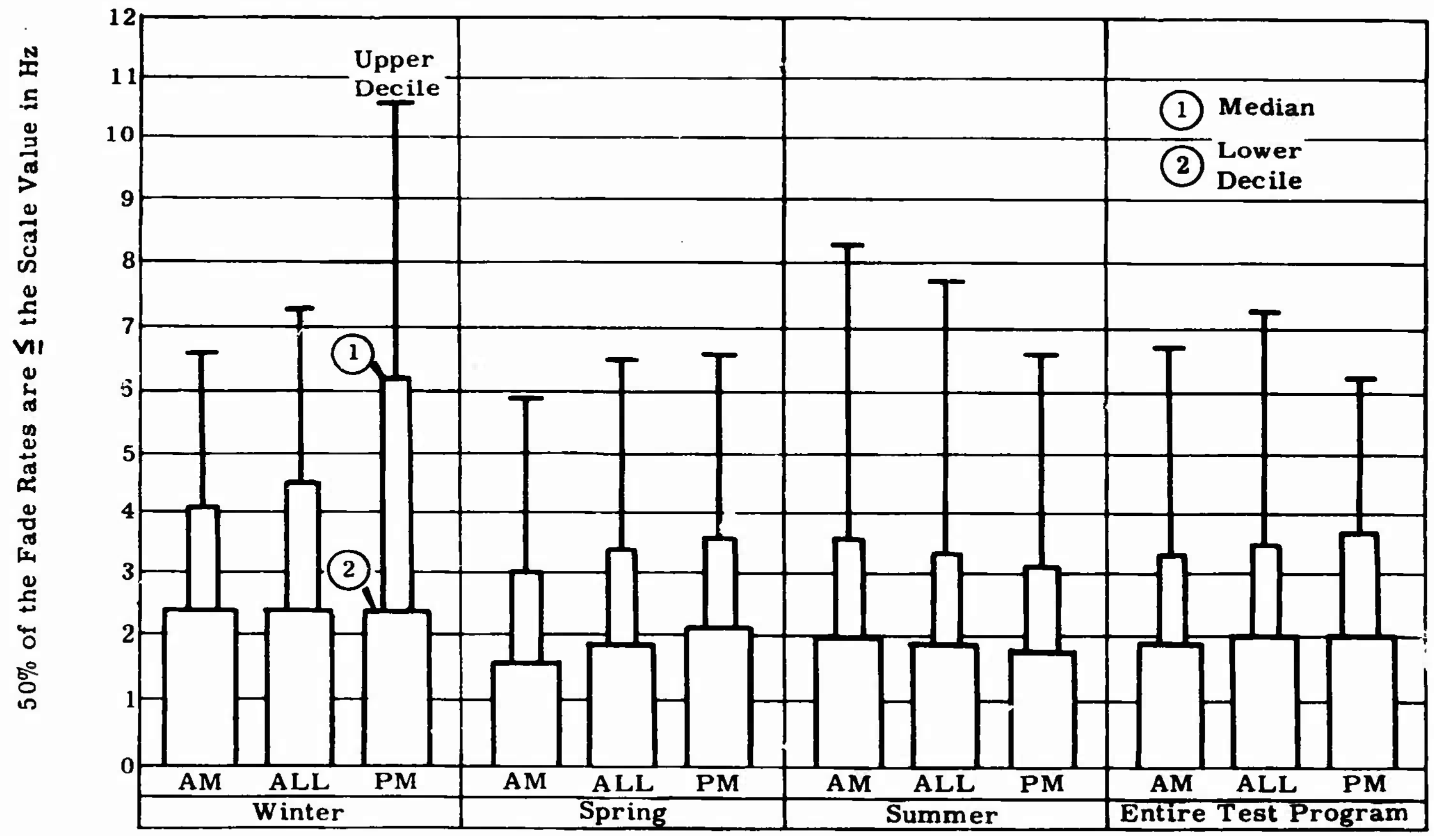


Figure 404. Fade Rate Summary

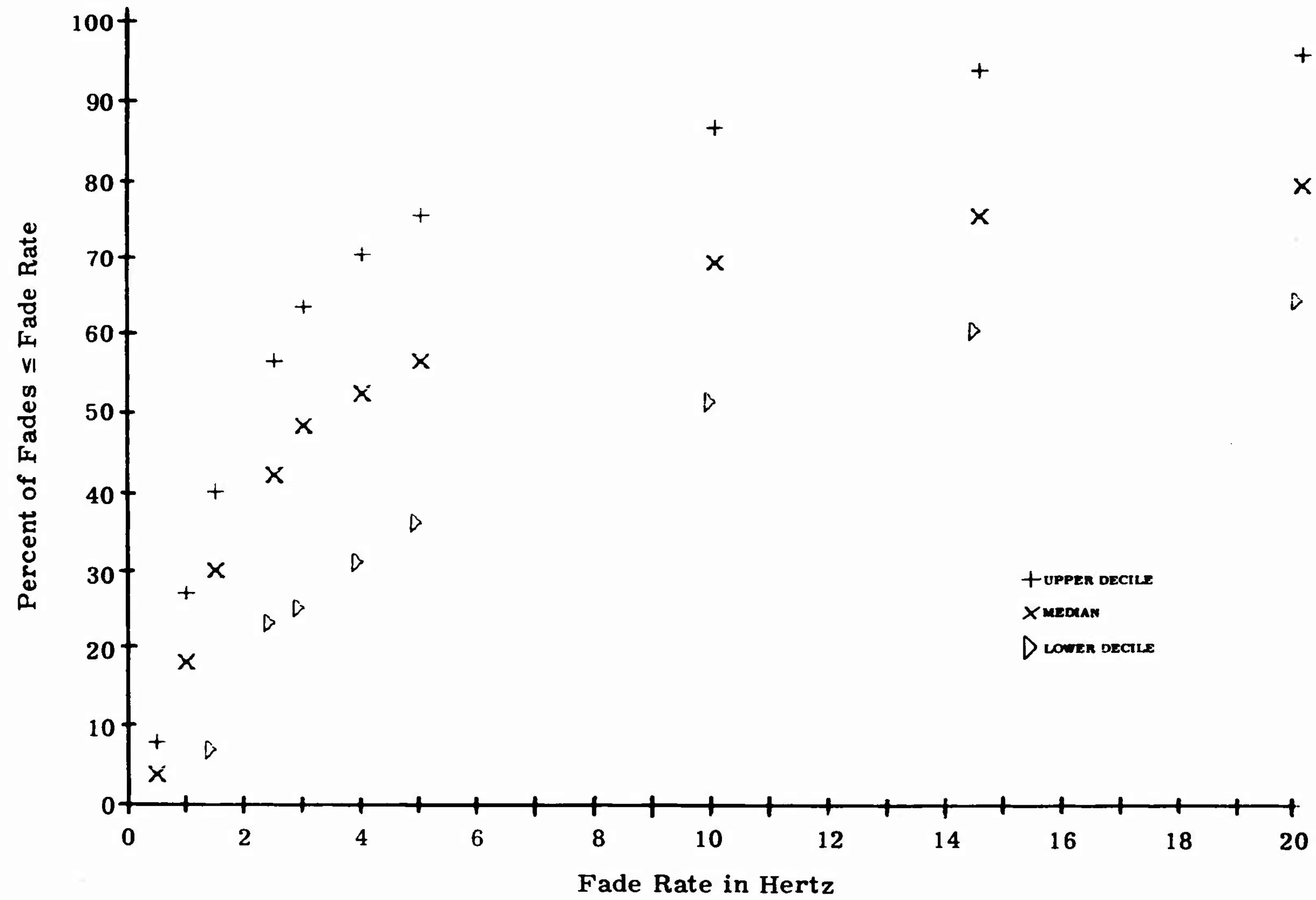


Figure 405. Fade Rate Distribution, Summer, AM

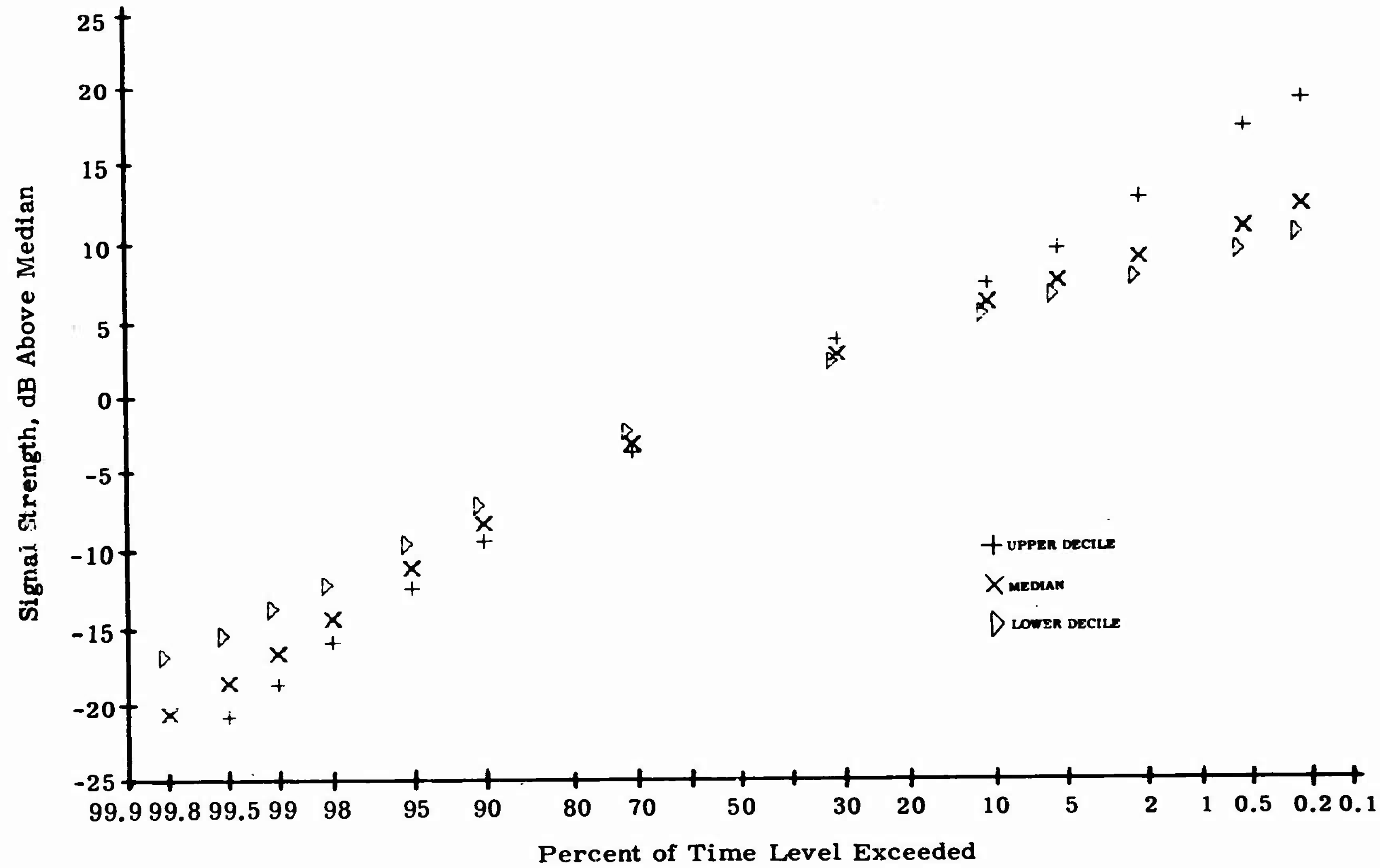


Figure 406. Signal Amplitude Distribution, Entire, ALL

I. EXPECTED PERFORMANCE OF VARIOUS MODEMS

In a previous MALLARD program several frequency diversity modems were evaluated over the Tobyhanna/Hexagon troposcatter link. These were reported in Reference 21. The diversity obtained by the use of frequency separation between branches depended on decorrelated fading between them. On the other hand, the data handling capacity of any individual branch depended on the correlation bandwidth of the branch. Thus it was found that the very mechanism that provided frequency diversity also was the mechanism that limited the channel capacity due to multipath distortions brought on by propagation through dispersive media. Nevertheless, it was found that frequency diversity at data rates of slightly over one megabit was obtainable through the use of simple frequency-time codes. An adaptive frequency selection system was also tested. It employed one branch at a time with a selection of frequency on a best-by-test basis and a transfer to the apparent best frequency through the use of frequency change command codes transmitted across the link.

From the data obtained during this test program it appears that the order of frequency diversity at X-band is essentially the same as that obtainable at C-band over these paths with 10 foot antennas. If the antenna sizes were to be increased one might expect the correlation bandwidth of X-band to eventually increase as the beamwidth became less than maximum usable effective beamwidth. Eventually, further increases in antenna size would cause the C-band correlation bandwidth to also increase for the same reason. Increases in correlation bandwidth would increase the data rates per branch of frequency diversity, but reduce the diversity obtainable among the individual branches.

The frequency-time modems can be expected to perform as well at X-band as they do at C-band from the standpoint of diversity obtained. Some fade margin, however, is lost at X-band due to increased path loss and medium to aperture coupling losses at the higher frequency. The high fade rates obtained over these paths at both frequencies do not appear to pose a problem for the frequency-time modems as they can have high speed AGC circuits that can cope with the rapid changes in signal strength.

The adaptive frequency modems should obtain the same orders of diversity and path losses as the frequency-time modems. They do, however, have a problem in coping with enormous fade rates that have been encountered over these paths. There is a definite time required between the tests to determine the apparent best frequency and the effecting of a change to that frequency. This requires the propagation across the link of the best frequency command code twice (minimum) so that even before the system can transfer to the new best frequency it may no longer be optimum. The system tested during the previous program must therefore be further developed to operate through higher fade rates.

All modems should operate through a ducting condition since it is characterized by an unusually high signal strength with shallow fades. Frequency diversity is not readily obtainable during ducting, but with such strong signals the diversity gain is usually not needed anyway, and all modems operate essentially error free. The apparent small correlation bandwidth sometimes calculated during ducting conditions should be viewed with caution before applying it to an error rate prediction curve because the fade structure is usually very shallow and seldom plunges into the noise. The computed cross correlation coefficients so obtained are normalized by subtracting out the strong dc term (average signal strength) in computation. Thus a relatively meaningless cross correlation coefficient might be calculated that cannot be applied to the prediction of errors when such error predictions are based on Rayleigh fading which is decidedly not the case during ducting.

APPENDIX A

THE BELLO MODEL FOR THE TROPOSCATTER CHANNEL

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APPENDIX A

THE BELLO MODEL FOR THE TROPOSCATTER CHANNEL

A fairly recent addition to the literature concerning troposcatter channels has been made by Bello. As this model was not treated in detail in the prior interim reports of this contract, it will be considered here, especially as it pertains to the four links for which experimental data have been taken.

This model rests on the useful concept of the delay power spectrum $Q(\xi)$ of a troposcatter channel which is the time domain response of a (linear) channel to a unit impulse. It is possible to derive from first principles the delay power spectrum expected; essentially the Booker-Gordon model is used to find the scattered power from each shell of constant time delay (ξ). These surfaces are prolate spheroids with transmitter and receiver at the foci. The delay power spectrum is analogous to the notion of multipath spread and in fact the rms value of $Q(\xi)$ could be considered as just Δ. Most importantly, Bello shows that under typical conditions expected to be present for the troposcatter medium, the frequency correlation function is precisely the Fourier transform of the delay power spectrum. Thus emphasis is placed on obtaining $Q(\xi)$ since it is a simple extension to obtain $R(\Omega)$, the correlation function.

The power received via a troposcatter link from a single scatterer will be given by the bistatic radar equation, i.e.,

$$dP = \frac{G\,H}{R^2 T^2}\,\sigma \tag{A-1}$$

where R and T are the distances from the transmitter and receiver respectively to a Booker-Gordon "blob" having scattering cross section σ. G and H are the two antenna gains.

The notation used in this model is indicated in Figure A-1. The scattering cross section σ is a sensitive function of the scatter angle, θ, and also depends on the air density in the common volume or the height h above ground, and the volume dV of the "blob." Bello writes

$$\sigma(\theta) = \frac{dV}{\theta^m h} \tag{A-2}$$

where the exponent, m, obtained experimentally, has been assumed to be approximately five. The inverse h dependence is also empirical, although Bello states that the exact form is fairly insensitive.

Simplifying to a cylindrical co-ordinate system (i.e., cylindrical ellipsoids in lieu of prolate spheroids), a differential volume is found to be

$$dV \sim \frac{2\delta}{\psi(\psi + 2\delta/\psi)^3} \, d\psi \, d\xi \, dz \tag{A-3}$$

where δ is a simplifying notation corresponding to a normalized path delay:

$$\delta = \frac{\xi - D/c}{D/c} \qquad (c = \text{vel. of light}) \tag{A-4}$$

$$\simeq \frac{\psi\phi}{2} .$$

Using this notation, R and T are approximately

$$R \simeq D \frac{\psi}{\psi + 2\delta/\psi} \tag{A-5}$$

$$T \simeq D \frac{2\delta/\psi}{\psi + 2\delta/\psi} \tag{A-6}$$

Finally, the scattering angle θ is very nearly

$$\theta \simeq \psi + 2\delta/\psi \tag{A-7}$$

Thus, the power scattered toward the receiver from a single blob of volume dV is

$$dP \sim \frac{G(\psi - \psi_o) \; H(\phi - \phi_o)}{\delta^2 \; \theta^{m-2}} \; \frac{d\psi \; d\xi \; dz}{\psi} \tag{A-8}$$

The quantities ψ_o and ϕ_o do not correspond exactly to the normal usage of the term takeoff angle. As seen in Figure A-1, ψ_o and ϕ_o are measured from the straight line D rather than up or down from the smooth earth tangent at the two foci.

The total power reaching the receiver from a shell characterized by ξ is then equal to the value of $Q(\xi)$ for ξ to $\xi + d\xi$ and is obtained by integration over z for some reasonable distance and over ψ. That is,

$$Q(\xi) \; d\xi \sim \frac{1}{\delta^2} \int_{\psi_o}^{\psi_1} \frac{G(\psi - \psi_o) \; H(\phi - \phi_o)}{\theta^{m-2} \psi} \, d\psi \, d\xi \tag{A-9}$$

ψ_o and ψ_1 correspond to the two extremes of ψ for possible scatter toward the receiver. Below ψ_o no power can propagate past the transmitter horizon; angles above ψ_1 correspond to a receiver angle less than ϕ_o. In fact, from the above A-4.

$$\psi_1 = \frac{2\delta}{\phi_o} \tag{A-10}$$

Expressing ϕ and θ in terms of ψ (from A-4,7) $Q(\xi)$ becomes

$$Q(\xi) \equiv \hat{Q}(\delta) \sim \frac{1}{\delta^2} \int_o^{2\delta/\phi_o} \frac{G(\psi-\psi_o)\ H(2\delta/\psi - \phi_o)}{(\psi-2\delta/\psi)^{m-2}\psi}\, d\psi \tag{A-11}$$

For calculational convenience, the dummy ψ may be replaced by $x = \psi/\sqrt{2\delta}$ yielding

$$\hat{Q}(\delta) = \frac{1}{\delta^{(1+m/2)}} \int_{\frac{\psi_o}{\sqrt{2\delta}}}^{\sqrt{2\delta}/\phi_o} \frac{G(x\sqrt{2\delta} - \psi_o)\ H(\sqrt{2\delta}/x - \phi_o)}{(x + \frac{1}{x})^{m-2}\, x}\, dx \tag{A-12}$$

Bello assumes a symmetric Gaussian shape for the two beam patterns so that

$$G(\psi) = H(\psi) = \exp(-\psi^2/\sigma^2)$$

and

$$\sigma \simeq 0.6(\text{HPBW})$$

The above expression is not simply integrable; however, numerical integration is straightforward. Specifically, for the results that follow, (XTRAN) four point Gaussian quadrature was used with $Q(\delta)$ found for 512 evenly spaced samples of δ. The range of δ was chosen from δ_o ($\simeq \psi_o\phi_o/2$) to a point where $Q(\delta)$ was down by a factor of 10^9 from its peak value. Care must be exercised to insure that the integral's upper limit is always greater than or equal to the lower limit. $Q(\delta)$ thus found will not be normalized but in general only its shape is important.

Of prime importance is not $Q(\delta)$ but $R(\Omega)$ which is the Fourier transform of Q. This is again a simple process (using a computer) with the Cooley-Tukey Fast Fourier Transform algorithm employed here. The entire integration-transform program is not listed in this report but is available.

For test links of this program, the predicted correlation functions using the Bello model are shown in Figure A-2. The takeoff angles were calculated assuming 4/3 earth radius and not considered identically zero. It is obvious that the predicted bandwidths are considerably larger than the median correlation bandwidths measured here. To more accurately fit the data, several modifications might be attempted. The beamwidths used were the actual beamwidths and these could be reduced; however, if the effective beamwidths are used, the multipath spread will decrease and this will broaden rather than decrease the correlation bandwidth. The parameter m might also be altered,

especially since it is empirical. Figure A-3 displays the effect of various values of m for one link, Point Petre, C-band. For m equal to 3 or 1, the situation is improved although still wider than the median bandwidths observed.

It should be noted that these findings are in agreement with another comparison of the Bello model with a previously conducted test link, Ontario Center-Youngstown,(85 mile) L-band using 28 foot antennas[24]. In that series of tests, the predicted correlation bandwidth was also found considerably larger than that measured. Since the Bello model gave an excellent fit to a longer L-band path (170 mile) in that same series of tests, it probably can be made to fit the C-and-X band data in this report with some modification. One relation that was not investigated was the 1/h dependence of σ. This dependence might not be as insensitive as thought.

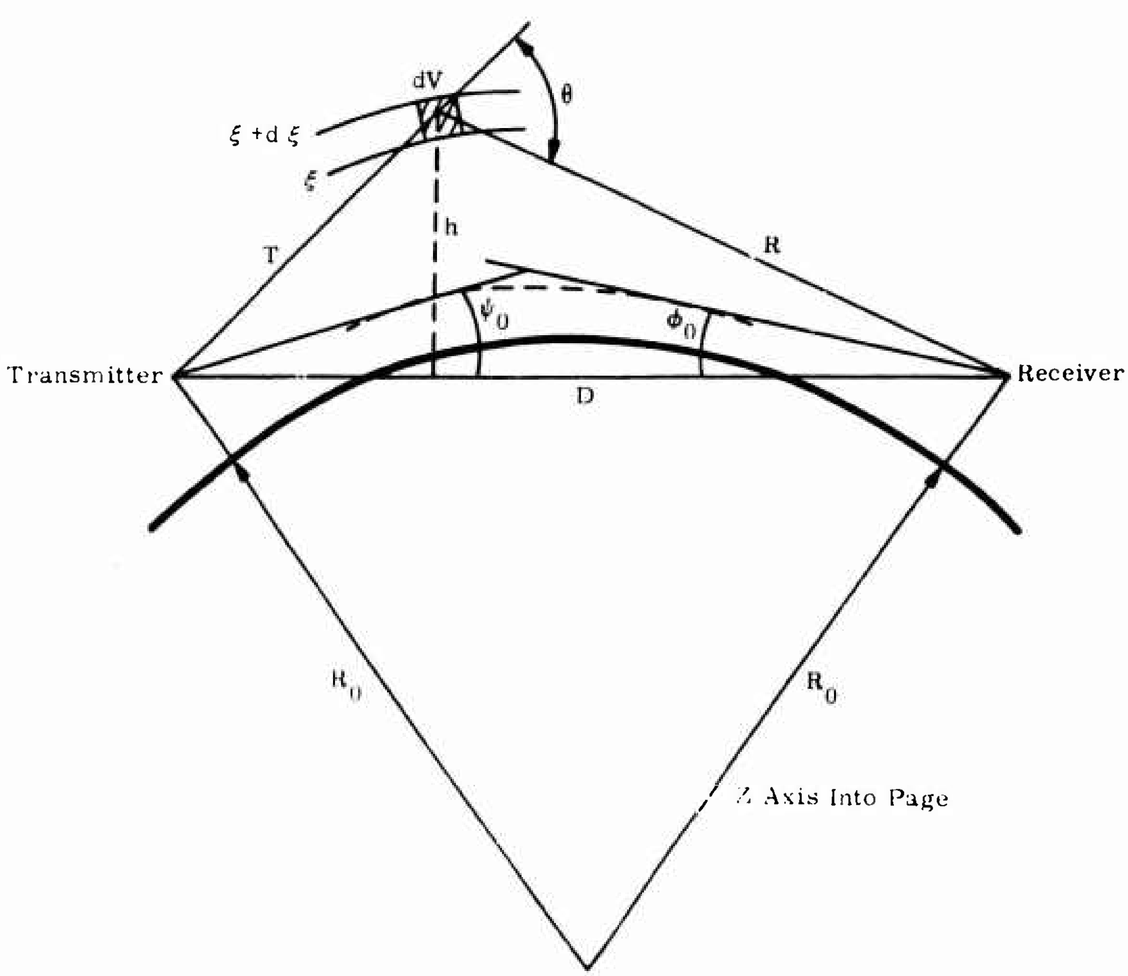

Figure A-1. Geometry Used in the Bello Model

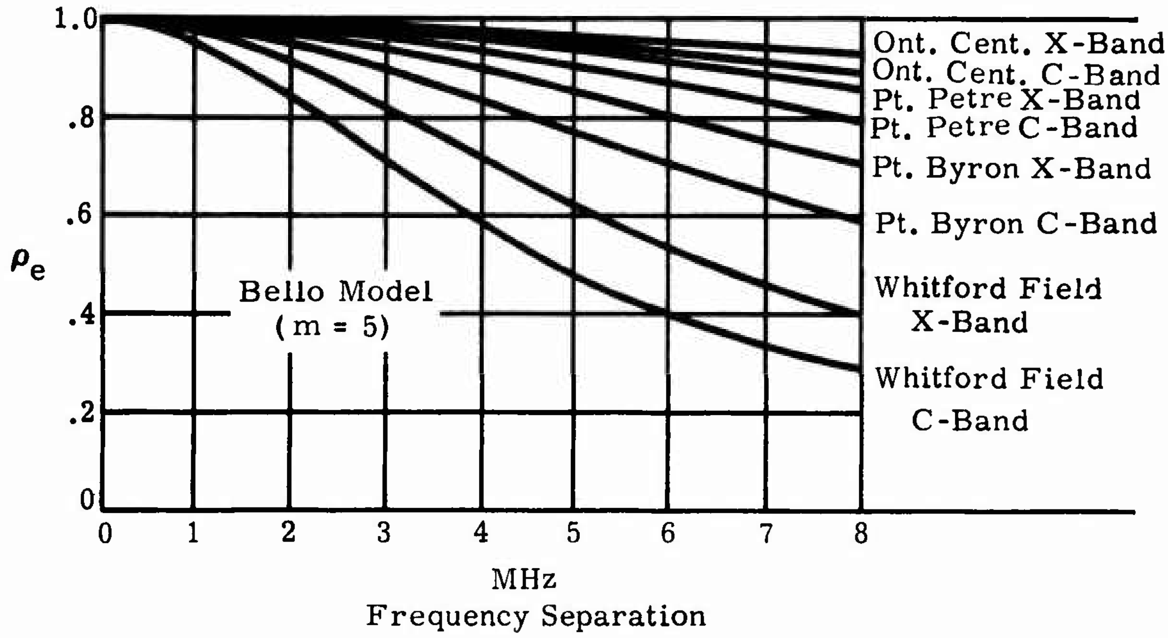

Figure A-2. Frequency Correlation Function Using the Bello Model for the Four Test Links, X- and C-Band

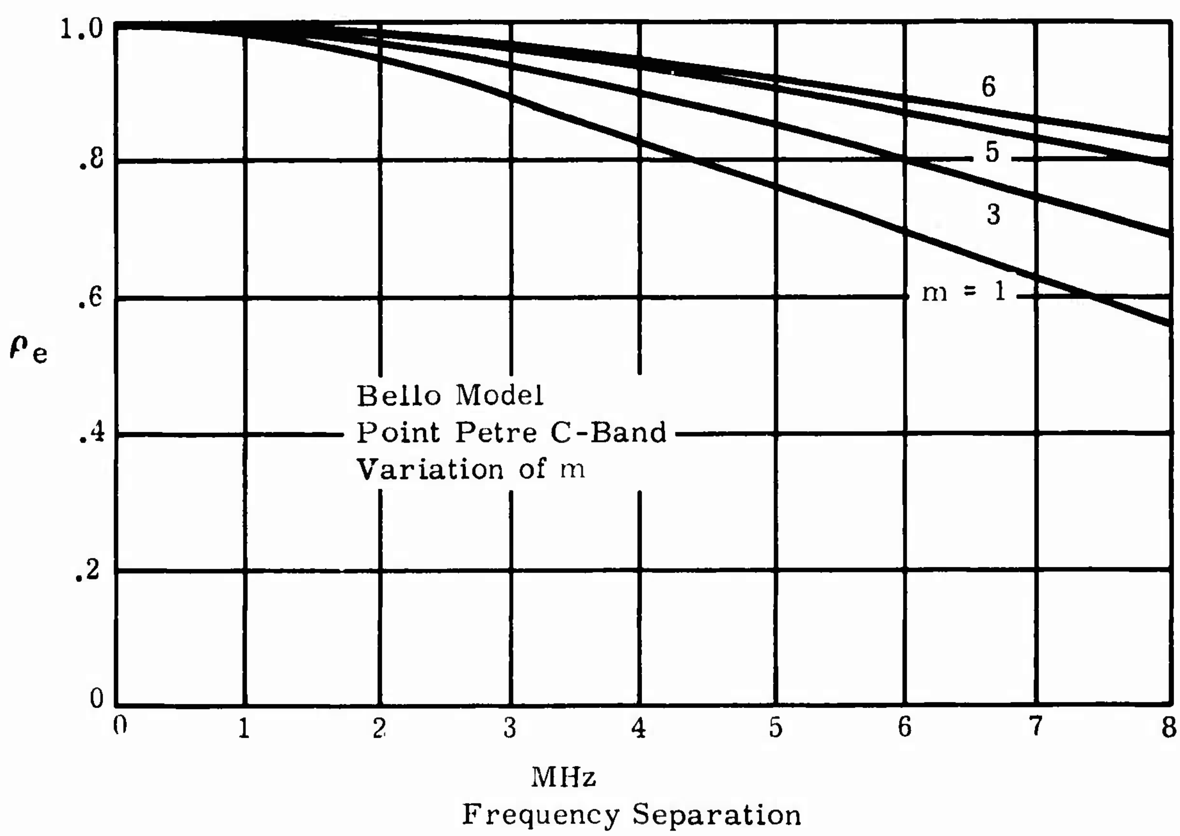

Figure A-3. Frequency Correlation Function Using the Bello Model for Point Petre, C-Band and Varying the Parameter m

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APPENDIX B

ROCHESTER WEATHER DATA

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LOCAL CLIMATOLOGICAL DATA

U. S. DEPARTMENT OF COMMERCE - MAURICE H. STANS, Secretary

ENVIRONMENTAL SCIENCE SERVICES ADMINISTRATION -- ENVIRONMENTAL DATA SERVICE

ROCHESTER, NEW YORK
ROCHESTER-MONROE COUNTY AP
AUGUST 1969

Latitude 43° 07' N Longitude 77° 40' W Elevation (ground) 547 ft. Standard time used EASTERN

Date	Temperature (°F) Maximum	Minimum	Average	Departure from normal	Average dew point	Degree days (Base 65°) Heating	Cooling	Weather types shown by code 1-9 on dates of occurrence (1 Fog, 2 Heavy Fog X, 3 Thunderstorm, 4 Sleet, 5 Hail, 6 Glaze, 7 Duststorm, 8 Smoke, Haze, 9 Blowing Snow)	Snow, Sleet, or Ice on ground at 07AM (In.)	Precipitation Water equivalent (In.)	Snow, sleet (In.)	Avg. station pressure (In.) Elev. 555 feet m.s.l.	Wind Resultant direction	Resultant speed (m.p.h.)	Average speed (m.p.h.)	Fastest mile Speed (m.p.h.)	Direction	Sunshine Hours and tenths	Percent of possible	Sky cover (Tenths) Sunrise to sunset	Midnight to midnight	Date
1	2	3	4	5	6	7A	7B	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	88	65	77	5	65	0	12	3 8	0	0	0	29.37	20	6.4	7.9	17	SW	7.9	54	6	7	1
2	81	65	73	1	66	0	8	1 3 5 8	0	.92	0	29.38	21	3.7	4.9	25	W	3.3	23	8	7	2
3	82	61	72	0	64	0	7	1 8	0	0	0	29.47	24	4.3	5.8	10	W	11.6	80	7	6	3
4	77	65	71	-1	64	0	6	8	0	0	0	29.44	19	2.8	3.9	5	S	0.7	5	10	10	4
5	83	63	73	2	64	0	8	1 8	0	.03	0	29.41	28	2.1	3.7	9	W	8.8	61	8	7	5
6	85	61	73	2	64	0	8	8	0	0	0	29.42	25	6.4	7.6	14	W	10.8	76	5	4	6
7	88	66	77	6	64	0	12	8	0	0	0	29.35	21	11.3	11.5	19	SW	9.8	69	6	6	7
8	83	71	77	6	62	0	12	8	0	0	0	29.12	24	13.8	15.4	31	W	10.8	76	5	7	8
9	82	66	74	3	63	0	9		0	.18	0	29.14	26	10.5	11.1	21	W	7.7	54	9	9	9
10	75	58	67	-4	62	0	2		0	.18	0	29.19	30	8.8	9.2	19	NW	7.2	51	9	8	10
11	77	55	66	-5	55	0	1		0	0	0	29.39	31	2.2	6.2	12	NW	12.4	88	3	4	11
12	81	57	69	-2	57	0	4		0	0	0	29.47	18	1.4	4.9	10	NE	11.7	83	4	3	12
13	84	55	70	-1	56	0	5		0	0	0	29.52	23	6.0	6.6	14	SW	14.1	100	1	1	13
14	89	62	76	5	60	0	11	8	0	0	0	29.50	20	6.3	6.8	11	SW	11.5	82	3	3	14
15	88	64	76	6	63	0	11	8	0	0	0	29.50	20	4.8	5.3	15	S	6.2	44	9	9	15
16	87	70	79	9	69	0	14	8	0	.10	0	29.35	20	8.2	8.6	20	S	4.8	35	9	9	16
17	83	69	76	6	68	0	11	1 8	0	.20	0	29.26	24	10.1	10.2	17	W	4.2	30	9	9	17
18	85	68	77	7	67	0	12	8	0	0	0	29.29	23	9.7	10.2	17	SW	10.2	74	6	6	18
19	79	61	70	0	59	0	5		0	.14	0	29.25	29	7.9	8.6	17	NW	10.7	78	2	3	19
20	70	51	61	-9	46	4	0		0	0	0	29.44	34	6.7	8.8	14	NW	13.0	94	4	2	20
21	74	49	62	-8	47	3	0		0	0	0	29.49	28	4.6	6.6	14	NW	13.7	100	0	0	21
22	80	49	65	-4	52	0	0		0	0	0	29.54	26	6.6	7.1	12	W	13.7	100	0	0	22
23	85	55	70	1	59	0	5		0	0	0	29.56	26	4.2	6.8	11	W	12.5	92	1	1	23
24	91	60	76	7	63	0	11	1 8	0	0	0	29.50	27	7.5	8.6	16	W	13.6	100	0	0	24
25	89	61	75	6	60	0	10	1 8	0	0	0	29.37	28	9.0	10.2	21	NW	11.2	83	3	3	25
26	72	57	65	-4	50	0	0		0	0	0	29.51	36	8.2	9.4	17	N	12.8	95	2	3	26
27	77	46*	62	-6	48	3	0		0	0	0	29.63	24	2.5	5.5	11	W	13.4	100	4	3	27
28	88	60	74	6	55	0	9		0	0	0	29.61	22	7.8	8.2	15	SW	12.9	96	1	1	28
29	88	64	76	8	61	0	11	8	0	.07	0	29.58	23	7.9	8.9	14	SW	5.8	44	6	6	29
30	90	66	78	11	65	0	13	1 8	0	0	0	29.61	25	5.9	7.1	13	W	7.8	59	1	1	30
31	92*	70	81	14	65	0	16	1 8	0	0	0	29.59	24	8.8	9.4	17	SW	11.4	86	1	1	31
	Sum 2573	Sum 1890				Total 10	Total 233			Total 1.82	Total 0	For the month 29.43	25	5.2	7.9	31	W	Total 306.2	% for month	Sum 142	Sum 139	
	Avg. 83.0	Avg. 61.0	Avg. 72.0	Dep. 2.3	Avg. 60	Dep. -21	Dep.			Dep -0.90						Date	08	Possible 431.1	71	Avg. 4.6	Avg. 4.5	

Number of days				Season to date	
Maximum Temp. ≥ 32°	Maximum Temp. ≥ 90° ‡	Minimum Temp. ≤ 32°	Minimum Temp. ≤ 0°	Total	Total
0	3	0	0	28	547
				Dep. -12	Dep.

Number of days	
Precipitation ≥ .01 inch	8
Snow, sleet ≥ 1.0 inch	0
Thunderstorms	2
Heavy fog X	0

Greatest in 24 hours and dates				Greatest depth on ground of snow, sleet or ice and date	
Precipitation		Snow, Sleet			
.92	2	0		0	

HOURLY PRECIPITATION (Water equivalent in inches)

Date	A.M. Hour ending at 1	2	3	4	5	6	7	8	9	10	11	12	P.M. Hour ending at 1	2	3	4	5	6	7	8	9	10	11	12	Date
1																									1
2		.43	T			.01								.25	T		T	.23							2
3																									3
4																									4
5																	.02	.01							5
6																									6
7																									7
8																									8
9																	.01	.15	T			T	.02	T	9
10	.17	T	T	T	T				.01	T															10
11																									11
12																									12
13																									13
14																									14
15																									15
16																		.01	.04	T	T	.03	T	.02	16
17	.02	.01	.04	.03	.02	.02	T			.03	.02	.01	T	T											17
18																									18
19					.11	.03	T																		19
20																									20
21																									21
22																									22
23																									23
24																									24
25																									25
26																									26
27																									27
28																									28
29														.07											29
30																									30
31																									31

* Extreme temperatures for the month. May be the last of more than one occurrence.
– Below zero temperature or negative departure from normal.
‡ ≥ 70° at Alaskan stations.
+ Also on an earlier date, or dates.
X Heavy fog restricts visibility to ¼ mile or less.
T In the Hourly Precipitation table and in columns 9, 10, and 11 indicates an amount too small to measure.
The season for degree days begins with July for heating and with January for cooling.
Data in columns 6, 12, 13, 14, and 15 are based on 8 observations per day at 3-hour intervals.
Wind directions are those from which the wind blows. Resultant wind is the vector sum of wind directions and speeds divided by the number of observations. Figures for directions are tens of degrees from true North; i.e., 09 = East, 18 = South, 27 = West, 36 = North, and 00 = Calm. When directions are in tens of degrees in Col. 17, entries in Col. 16 are fastest observed 1-minute speeds. If the / appears in Col. 17, speeds are gusts.

Any errors detected will be corrected and changes in summary data will be annotated in the annual summary.

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I certify that this is an official publication of the Environmental Science Services Administration, and is compiled from records on file at the National Weather Records Center, Asheville, North Carolina 28801.

William H. Haggard

Director, National Weather Records Center

SUMMARY BY HOURS

Hour (Local time)	AVERAGES Sky cover (In tenths)	Station pressure (In.)	Dry bulb (°F)	Wet bulb (°F)	Rel. hum. %	Dew point (°F)	Wind speed (m.p.h.)	Resultant wind Direction	Speed (m.p.h.)
01	4	29.42	65	62	84	60	5.9	23	4.3
04	4	29.42	63	61	88	59	6.3	23	5.1
07	4	29.45	66	63	84	61	7.1	22	5.0
10	4	29.46	76	67	63	62	9.7	25	6.7
13	5	29.43	81	67	48	59	10.9	27	8.3
16	5	29.40	81	67	47	58	10.5	28	7.2
19	5	29.41	74	65	64	60	7.0	25	4.0
22	5	29.42	68	63	79	61	5.7	22	4.5

USCOMM--ESSA--ASHEVILLE 350

OBSERVATIONS AT 3-HOUR INTERVALS

Day	Hour	Sky cover (tenths)	Ceiling (hundreds of ft.)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (°F)	Wet bulb (°F)	Rel. hum. (%)	Dew pt. (°F)	Wind dir	Wind speed (knots)
01	01	8	CIR	10			67	65	90	64	20	5
01	04	5	UNL	10			66	64	90	63	20	6
01	07	6	100	6		H	70	67	84	65	18	9
01	10	6	UNL	6		H	81	72	63	67	20	9
01	13	3	UNL	7			85	71	49	64	23	10
01	16	8	40	7			86	72	50	65	24	9
01	19	8	120	6		H	75	68	71	65	07	6
01	22	10	70	6		TH	71	70	93	69	18	3
02	01	10	40	7			69	68	93	67	25	6
02	04	10	45	7			66	65	97	65	23	6
02	07	10	CIR	1	8	GF	69	68	97	68	19	6
02	10	5	UNL	4		H	74	70	82	68	16	5
02	13	8	33	4		H	80	72	67	68	22	6
02	16	5	UNL	2	8	H	77	72	76	69	20	3
02	19	5	UNL	4		TH	71	65	73	62	10	3
02	22	6	100	7			65	64	97	64	24	5
03	01	0	UNL	6		GF	65	64	97	64	23	6
03	04	0	UNL	7			62	61	97	61	24	6
03	07	1	UNL	5		GFH	65	64	97	64	24	5
03	10	7	UNL	15			74	68	71	64	23	8
03	13	8	UNL	15			78	68	58	62	27	8
03	16	9	UNL	15			80	69	56	63	27	4
03	19	10	80	15			75	68	71	65	10	6
03	22	8	100	15			70	67	87	66	19	3
04	01	10	CIR	12			67	66	97	66	18	3
04	04	10	90	8			65	64	97	64	23	4
04	07	10	90	7			66	65	97	65	24	4
04	10	10	CIR	7			73	69	82	67	23	4
04	13	10	100	8			76	68	66	64	21	3
04	16	10	120	10			76	66	60	61	14	3
04	19	10	120	10			73	67	71	63	13	3
04	22	10	120	10			69	66	87	65	13	3
05	01	10	95	10			68	66	90	65	00	0
05	04	10	90	10			65	64	97	64	23	4
05	07	7	UNL	4		GF	67	66	93	65	22	5
05	10	6	UNL	7			77	67	60	62	28	5
05	13	8	CIR	12			81	68	51	61	30	7
05	16	10	35	8			79	68	56	62	03	5
05	19	7	70	7			73	70	87	69	00	0
05	22	0	UNL	7			65	64	97	64	00	0
06	01	3	UNL	7			63	62	97	62	22	3
06	04	3	UNL	7			61	60	97	60	21	8
06	07	5	UNL	5		H	65	64	93	63	23	4
06	10	8	100	5		H	77	71	74	68	29	10
06	13	5	UNL	7			80	70	60	65	24	6
06	16	5	UNL	10			83	70	53	64	28	10
06	19	2	UNL	7			76	69	69	65	27	6
06	22	0	UNL	7			70	66	81	64	20	6
07	01	5	UNL	7			69	66	84	64	21	8
07	04	5	UNL	7			67	64	87	63	23	8
07	07	0	UNL	5		H	70	66	79	63	20	9
07	10	9	100	4		H	79	71	67	67	20	11
07	13	7	CIR	7			85	71	49	64	22	12
07	16	8	120	5		H	85	72	51	65	22	12
07	19	8	CIR	5		H	81	70	58	65	20	10
07	22	10	CIR	7			79	69	58	63	22	10
08	01	10	70	8			71	69	69	65	19	10
08	04	10	46	8			[illegible]	68	66	64	22	11
08	07	2	UNL	5		H	75	69	74	66	20	9
08	10	9	35	5		H	80	71	65	67	25	13
08	13	4	UNL	10			83	68	46	60	26	23
08	16	2	UNL	15			81	66	44	57	26	20
08	19	7	85	15			74	64	58	58	25	13
08	22	8	60	10			73	65	66	61	20	8
09	01	10	70	12			70	66	79	63	27	7
09	04	10	65	12			69	65	81	63	25	6
09	07	8	70	10			68	64	81	62	24	7
09	10	10	30	10			77	69	64	64	25	15
09	13	7	46	15			82	68	49	61	27	18
09	16	8	45	15			80	69	56	65	27	16
09	19	10	40	10			70	68	90	67	29	10
09	22	10	45	7		RW	67	65	90	64	21	4
10	01	10	13	7		RW	66	65	97	65	28	4
10	04	10	70	10		RW	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10	07	8	80	7			64	63	97	63	30	7
10	10	10	16	12			71	66	87	67	32	9
10	13	8	25	15			74	65	62	60	32	13
10	16	9	38	15			72	63	59	57	31	15
10	19	9	70	15			68	62	73	59	28	6
10	22	4	UNL	15			61	59	90	58	26	7
11	01	0	UNL	15			57	56	96	56	25	5
11	04	5	UNL	15			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
11	07	0	UNL	10			62	61	93	60	27	5
11	10	1	UNL	15			71	62	61	57	28	7
11	13	7	80	15			73	61	50	53	01	5
11	16	3	UNL	15			76	63	47	54	04	8
11	19	7	70	15			69	59	53	51	05	5
11	22	10	70	15			66	60	68	55	18	3
12	01	2	UNL	15			60	58	87	56	19	3
12	04	[illegible]	UNL	15			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
12	07	3	UNL	15			61	58	84	56	19	5
12	10	0	UNL	12			74	64	58	58	17	4
12	13	7	45	15			78	62	39	51	23	3
12	16	6	46	15			79	65	47	57	36	5
12	19	1	UNL	15			73	64	62	59	06	7
12	22	0	UNL	15			63	61	87	59	25	4
13	01	0	UNL	12			63	59	87	56	23	3
13	04	0	UNL	12			59	57	93	56	22	4
13	07	0	UNL	10			62	60	87	[illegible]	20	5
13	10	2	UNL	10			75	66	60	60	23	3
13	13	2	UNL	10			82	64	35	[illegible]	[illegible]	10
13	16	1	UNL	15			84	64	31	50	[illegible]	13
13	19	0	UNL	10			76	62	43	52	26	5
13	22	0	UNL	8			67	63	78	60	18	3
14	01	0	UNL	10			64	60	81	58	20	5
14	04	7	CIR	10			65	61	81	59	20	8
14	07	1	UNL	6		H	70	64	71	60	20	8
14	10	0	UNL	6		H	78	68	60	63	22	6
14	13	4	UNL	6		H	85	69	45	61	16	8
14	16	4	UNL	7			88	68	35	57	23	5
14	19	1	UNL	7			81	68	51	61	17	4
14	22	3	UNL	7			72	67	76	64	19	3
15	01	6	UNL	7			66	62	81	60	23	3
15	04	6	UNL	7			64	61	84	59	20	4
15	07	10	UNL	5		H	68	65	87	64	20	5
15	10	5	UNL	6		H	80	71	62	66	22	7
15	13	10	140	6		H	86	68	39	58	21	5
15	16	10	120	6		H	87	68	37	58	13	3
15	19	10	100	7			81	72	63	67	22	5
15	22	10	CIR	8			76	71	76	68	17	5
16	01	10	CIR	7			74	70	82	68	[illegible]	3
16	04	10	CIR	7			70	68	90	67	24	4
16	07	8	CIR	5		H	74	71	84	69	20	8
16	10	3	UNL	6		H	83	75	67	71	17	[illegible]
16	13	10	100	5		H	84	74	61	69	18	6
16	16	10	100	6		H	83	73	[illegible]	[illegible]	18	7
16	19	10	38	6		RW	73	[illegible]	[illegible]	[illegible]	20	15
16	22	10	100	8		RW	[illegible]	65	[illegible]	[illegible]	22	11
17	01	10	55	10		RW	70	68	90	67	23	8
17	04	10	45	6		RW	69	68	93	67	23	8
17	07	10	45	7			72	69	87	68	24	8
17	10	10	12	3		RWH	74	71	87	70	24	10
17	13	10	80	7		RW	78	71	71	68	25	12
17	16	8	100	7			80	72	67	68	25	10
17	19	8	CIR	8			76	70	74	67	25	7
17	22	10	CIR	8			73	69	82	67	25	8
18	01	8	CIR	8			72	69	87	68	22	7
18	04	3	UNL	10			70	67	84	65	22	4
18	07	10	15	10			70	67	84	65	20	6
18	10	5	UNL	5		H	80	72	69	69	25	12
18	13	5	UNL	6		H	85	73	57	68	25	13
18	16	4	UNL	7			85	73	57	68	25	13
18	19	10	UNL	10			78	71	69	67	22	8
18	22	5	UNL	10			74	68	74	65	21	8
19	01	8	UNL	10			[illegible]	[illegible]	[illegible]	55	25	7
19	04	10	80	10			[illegible]	[illegible]	[illegible]	66	25	6
19	07	10	45	8			71	68	84	66	30	8
19	10	0	UNL	15			74	62	50	54	30	9
19	13	0	UNL	15			78	63	44	54	28	8
19	16	1	UNL	15			77	63	43	53	31	13
19	19	0	UNL	15			70	61	59	55	27	5
19	22	0	UNL	15			61	57	81	55	32	4
20	01	0	UNL	15			63	54	56	47	03	8
20	04	0	UNL	15			58	53	70	48	03	6
20	07	2	UNL	15			62	55	63	49	02	7
20	10	6	UNL	15			65	55	52	47	35	11
20	13	7	UNL	15			66	55	47	45	31	7
20	16	4	UNL	15			70	55	35	41	32	9
20	19	0	UNL	15			65	53	45	43	30	6
20	22	0	UNL	15			53	50	80	47	27	7
21	01	0	UNL	15			51	49	90	48	25	5
21	04	0	UNL	15			51	50	93	49	22	7
21	07	0	UNL	15			57	55	87	53	25	3
21	10	2	UNL	15			68	55	42	44	32	6
21	13	0	UNL	15			72	56	35	43	30	5
21	16	0	UNL	15			74	57	33	43	32	10
21	19	0	UNL	15			66	56	51	47	27	5
21	22	0	UNL	15			54	51	83	49	23	5
22	01	0	UNL	15			53	52	93	51	23	6
22	04	0	UNL	15			51	50	93	49	24	5
22	07	0	UNL	15			55	53	90	52	24	5
22	10	0	UNL	15			72	62	57	56	25	7
22	13	0	UNL	15			78	62	39	51	29	7
22	16	0	UNL	15			80	62	35	50	28	7
22	19	0	UNL	15			69	59	55	52	25	6
22	22	0	UNL	15			61	56	75	53	25	6
23	01	0	UNL	15			60	57	84	55	21	5
23	04	0	UNL	15			56	55	93	54	23	5
23	07	0	UNL	15			61	58	84	56	21	6
23	10	0	UNL	15			78	67	54	60	27	8
23	13	1	UNL	15			85	69	43	60	32	7
23	16	2	UNL	15			85	70	46	62	33	8
23	19	0	UNL	15			78	68	60	63	18	5
23	22	0	UNL	15			69	65	79	62	26	3
24	01	0	UNL	12			66	63	87	62	21	4
24	04	0	UNL	12			61	60	93	59	23	4
24	07	0	UNL	5		H	67	64	87	63	24	5
24	10	0	UNL	8			82	71	56	65	27	7
24	13	0	UNL	12			87	72	48	65	27	12
24	16	0	UNL	15			89	72	42	63	31	15
24	19	0	UNL	12			79	69	60	64	27	7
24	22	0	UNL	12			69	65	79	62	24	6
25	01	0	UNL	12			67	66	84	62	25	6
25	04	0	UNL	6		GF	64	63	93	62	24	5
25	07	0	UNL	4		GF	68	66	90	65	23	5
25	10	0	UNL	7			81	69	54	63	26	12
25	13	0	UNL	10			88	66	30	53	29	18
25	16	7	UNL	15			87	68	36	57	31	13
25	19	9	70	15			74	65	60	59	31	6
25	22	6	70	15			69	64	76	61	31	6
26	01	6	65	15			69	61	61	55	02	8
26	04	3	UNL	15			64	60	73	56	02	7
26	07	0	UNL	15			66	60	70	56	02	9
26	10	5	UNL	15			68	59	57	52	03	11
26	13	3	UNL	15			69	56	44	46	34	19
26	16	0	UNL	15			70	55	35	41	34	10
26	19	0	UNL	15			62	53	52	44	37	6
26	22	10	46	15			60	53	65	48	[illegible]	1
27	01	6	49	15			56	52	78	49	00	0
27	04	0	UNL	15			49	48	93	47	19	2
27	07	8	UNL	15			51	48	83	46	19	6
27	10	8	UNL	15			64	55	56	47	19	7
27	13	9	UNL	15			73	60	46	51	31	10
27	16	0	UNL	15			77	59	33	46	34	5
27	19	0	UNL	15			68	57	51	49	25	5
27	22	0	UNL	15			63	56	65	51	16	3
28	01	0	UNL	15			62	57	73	53	20	5
28	04	0	UNL	15			60	55	75	52	22	6
28	07	0	UNL	15			63	57	68	52	21	6
28	10	0	UNL	15			77	64	48	56	22	10
28	13	3	UNL	15			86	67	36	56	21	10
28	16	0	UNL	15			87	67	34	55	25	9
28	19	0	UNL	8			73	65	64	60	25	6
28	22	0	UNL	10			70	62	64	57	22	5
29	01	0	UNL	10			67	61	70	57	22	10
29	04	8	80	10			65	59	70	55	23	7
29	07	8	UNL	6		H	67	60	68	56	22	8
29	10	9	UNL	5		H	81	68	51	61	23	9
29	13	4	UNL	4		H	87	71	43	62	28	10
29	16	5	UNL	2	8	H	77	70	71	67	23	10
29	19	7	CIR	4		H	76	69	71	66	24	6
29	22	6	CIR	4		H	71	66	76	63	10	2
30	01	0	UNL	4		H	67	64	84	62	20	3
30	04	0	UNL	4		H	66	63	84	61	22	5
30	07	1	UNL	2		GF	68	64	81	62	21	5
30	10	0	UNL	2	8	H	79	71	67	67	22	8
30	13	3	UNL	4		H	88	73	48	66	28	8
30	16	3	UNL	4		H	89	73	47	66	29	9
30	19	3	UNL	3		H	79	71	67	67	27	6
30	22	4	UNL	3		H	75	69	74	66	23	5
31	01	0	UNL	3		H	72	68	82	66	21	7
31	04	0	UNL	3		H	72	68	82	66	22	6
31	07	0	UNL	2		GFH	72	69	84	67	22	5
31	10	0	UNL	3		H	85	73	57	68	23	10
31	13	2	UNL	5		H	90	71	39	62	25	12
31	16	3	UNL	5		H	91	71	37	61	27	11
31	19	3	UNL	5		H	81	69	56	63	25	7
31	22	3	UNL	4		H	75	68	69	64	22	7

NOTES

CEILING COLUMN

UNL indicates an unlimited ceiling
CIR indicates a cirriform cloud ceiling of unknown height

WEATHER COLUMN

- • Tornado
- T Thunderstorm
- Q Squall
- R Rain
- RW Rain showers
- ZR Freezing rain
- L Drizzle
- ZL Freezing drizzle
- S Snow
- SP Snow pellets
- IC Ice crystals
- SW Snow showers
- SG Snow grains
- E Sleet
- A Hail
- AP Small hail
- F Fog
- IF Ice fog
- GF Ground fog
- BD Blowing dust
- BN Blowing sand
- BS Blowing snow
- BY Blowing spray
- K Smoke
- H Haze
- D Dust

WIND COLUMNS

Directions are those from which the wind blows, indicated in tens of degrees from true North; i. e., 09 for East, 18 for South, 27 for West. Entry of 00 in the direction column indicates calm.

Speed is expressed in knots, multiply by 1.15 to convert to miles per hour.

ADDITIONAL DATA

Other observational data contained in records on file can be furnished at cost via microfilm or microfiche copies of the original records. Inquiries as to availability and costs should be addressed to Director, National Weather Records Center, Federal Building, Asheville, N. C. 28801

STATION: ROCHESTER N Y YEAR & MONTH: 69 08

LOCAL CLIMATOLOGICAL DATA

U. S. DEPARTMENT OF COMMERCE - MAURICE H. STANS, Secretary
ENVIRONMENTAL SCIENCE SERVICES ADMINISTRATION
ENVIRONMENTAL DATA SERVICE

ROCHESTER, NEW YORK
ROCHESTER-MONROE COUNTY AP
SEPTEMBER 1969

Latitude 43° 07' N Longitude 77° 40' W Elevation (ground) 547 ft Standard time used EASTERN

Date	Temperature (°F) Maximum	Minimum	Average	Departure from normal	Average dew point	Degree days (Base 65°) Heating	Cooling	Weather types shown by code 1-9 on dates of occurrence (1 Fog, 2 Heavy Fog X, 3 Thunderstorm, 4 Sleet, 5 Hail, 6 Glaze, 7 Duststorm, 8 Smoke, Haze, 9 Blowing Snow)	Snow, Sleet, or Ice on ground at 07AM (In.)	Precipitation Water equivalent (In.)	Snow, sleet (In.)	Avg. station pressure (In.) Elev. 555 feet m.s.l.	Wind Resultant direction	Resultant speed (m.p.h.)	Average speed (m.p.h.)	Fastest mile Speed (m.p.h.)	Direction	Sunshine Hours and tenths	Percent of possible	Sky cover (Tenths) Sunrise to sunset	Midnight to midnight	Date
1	2	3	4	5	6	7A	7B	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	90*	67	79	12	64	0	14	1 8	0	0	0	29.56	25	7.0	8.1	15	SW	7.2	55	4	5	1
2	74	63	69	2	62	0	4	8	0	0	0	29.58	05	6.4	6.9	14	N	0.0	0	10	10	2
3	80	55	68	2	59	0	3	8	0	0	0	29.59	02	3.6	4.8	11	N	12.1	92	5	5	3
4	83	59	71	5	62	0	6	2 8	0	0	0	29.63	09	3.1	5.5	15	NE	7.5	57	9	7	4
5	88	63	76	10	64	0	11	1 8	0	T	0	29.54	19	6.2	8.2	17	SW	6.4	49	9	8	5
6	86	71	79	14	68	0	14	8	0	.12	0	29.41	24	9.7	10.4	18	SW	7.5	58	6	7	6
7	81	65	73	8	66	0	8	3 8	0	.08	0	29.34	25	6.7	8.2	17	W	2.3	18	10	9	7
8	77	55	66	1	56	0	1		0	0	0	29.32	29	6.5	7.	17	NW	8.4	65	6	6	8
9	68	49	59	-6	50	6	0		0	0	0	29.29	27	8.6	9.2	16	W	4.9	38	6	6	9
10	70	49	60	-4	42	5	0		0	0	0	29.47	28	9.4	10.1	17	W	10.4	81	3	4	10
11	70	47	59	-5	47	6	0		0	T	0	29.52	24	9.6	10.1	20	SW	1.6	13	10	7	11
12	79	50	65	1	49	0	0		0	0	0	29.48	23	12.6	13.2	32	SW	10.7	84	3	2	12
13	84	62	73	9	57	0	8		0	0	0	29.49	25	10.4	10.9	17	W	11.7	92	2	2	13
14	86	56	71	8	57	0	6		0	0	0	29.59	21	5.8	7.1	13	S	12.6	100	5	5	14
15	84	63	74	11	56	0	9	8	0	T	0	29.49	23	10.3	10.9	20	W	7.3	58	7	7	15
16	81	65	73	10	58	0	8	1 8	0	.04	0	29.40	22	10.7	11.1	18	W	0.3	2	10	10	16
17	66	51	59	-3	55	6	0	1	0	1.19	0	29.46	01	4.7	7.1	17	NE	0.0	0	10	9	17
18	63	44	54	-8	44	11	0		0	0	0	29.76	02	1.7	4.0	13	NE	8.0	65	6	5	18
19	63	39*	51	-10	42	14	0		0	0	0	29.90	07	4.3	5.5	13	NE	10.9	89	8	6	19
20	69	45	57	-4	44	8	0		0	0	0	29.84	12	6.1	6.6	11	SE	8.1	66	5	3	20
21	74	46	60	-1	48	5	0		0	0	0	29.78	12	3.6	5.9	10	NE	11.3	93	2	2	21
22	77	46	62	1	49	3	0		0	0	0	29.61	14	3.0	5.3	11	E	12.2	100	0	0	22
23	79	47	63	3	50	2	0		0	0	0	29.34	19	3.9	5.9	10	S	8.6	71	6	5	23
24	66	53	60	0	55	5	0	1 8	0	.34	0	29.20	31	4.0	8.3	15	N	0.0	0	10	10	24
25	55	51	53	-6	46	12	0		0	T	0	29.37	02	6.1	6.8	10	N	0.0	0	10	10	25
26	66	51	59	0	48	6	0		0	0	0	29.40	14	1.9	4.6	13	W	7.3	61	6	6	26
27	64	47	56	-3	49	9	0		0	0	0	[illegible]	23	8.3	8.8	16	SW	0.7	6	9	6	27
28	62	44	53	-6	45	12	0		0	T	0	[illegible]	27	7.3	8.2	[illegible]	W	4.1	34	8	6	28
29	63	42	53	-5	42	12	0		0	0	0	29.58	26	4.4	7.2	14	W	4.8	40	8	9	29
30	72	49	61	3	46	4	0		0	T	0	29.37	22	9.0	10.9	25	SW	2.9	25	9	8	30
	Sum	Sum				Total	Total			Total	Total	For the month						Total	% for month	Sum	Sum	
	2220	1594				126	92			1.77	0	29.50	24	3.5	7.9	32	SW	189.8		201	185	
	Avg.	Avg.	Avg.	Dep.	Avg.	Dep.	Dep.			Dep.						Date	12	Possible		Avg.	Avg.	
	74.0	53.1	63.6	1.2	53	0				-0.76								374.9	51	6.7	6.2	

Number of days				Season to date		Number of days		Greatest in 24 hours and dates		Greatest depth on ground of snow, sleet or ice and date
Maximum Temp.		Minimum Temp.		Total	Total	Precipitation ≥ .01 inch	5	Precipitation	Snow, Sleet	
≤ 32°	≥ 90° ‡	≤ 32°	≤ 0	154	639	Snow, sleet ≥ 1.0 inch	0	1.23 16-17	0	0
0	1	0	0	Dep	Dep	Thunderstorms	1			
				-12		Heavy fog X	1			

HOURLY PRECIPITATION (Water equivalent in inches)

Date	A.M. Hour ending at 1	2	3	4	5	6	7	8	9	10	11	12	P.M. Hour ending at 1	2	3	4	5	6	7	8	9	10	11	12	Date
1																									1
2																									2
3																									3
4																									4
5																				T	T	T	T		5
6								.09	.03	T	T														6
7										.08															7
8																									8
9																									9
10																									10
11													T	T											11
12																									12
13																									13
14																									14
15																		T							15
16																			T	T	T	T	T	.04	16
17	.03	.09	.16	.04	.04	.10	.32	.13	.08	.09	.01	.04	.02	.03	.01	T	T								17
18																									18
19																									19
20																									20
21																									21
22																									22
23																									23
24									T	.20	.08	.01	.02	.01	.01	.01	T	T	T	T	T	T	T	T	24
25	T	T																							25
26																									26
27																									27
28													T	T	T			T	T						28
29																									29
30					T	T																			30

- * Extreme temperatures for the month. May be the last of more than one occurrence.
- \- Below zero temperature or negative departure from normal.
- ‡ ≥ 70° at Alaskan stations.
- \+ Also on an earlier date, or dates.
- X Heavy fog restricts visibility to ¼ mile or less.
- T In the Hourly Precipitation table and in columns 9, 10, and 11 indicates an amount too small to measure.

The season for degree days begins with July for heating and with January for cooling.
Data in columns 6, 12, 13, 14, and 15 are based on 8 observations per day at 3-hour intervals.
Wind directions are those from which the wind blows. Resultant wind is the vector sum of wind directions and speeds divided by the number of observations. Figures for directions are tens of degrees from true North: i.e., 09 = East, 18 = South, 27 = West, 36 = North, and 00 = Calm. When directions are in tens of degrees in Col. 17, entries in Col. 16 are fastest observed 1-minute speeds. If the / appears in Col. 17, speeds are gusts.

Any errors detected will be corrected and changes in summary data will be annotated in the annual summary.

I certify that this is an official publication of the Environmental Science Services Administration, and is compiled from records on file at the National Weather Records Center, Asheville, North Carolina 28801.

William H. Haggard

Director, National Weather Records Center

SUMMARY BY HOURS

Hour (Local time)	Averages: Sky cover (In tenths)	Station pressure (In.)	Dry bulb (°F)	Wet bulb (°F)	Rel. hum. %	Dew point (°F)	Wind speed (m.p.h.)	Resultant wind: Direction	Speed (m.p.h.)
01	4	29.50	58	55	83	52	5.7	22	3.3
04	5	29.50	57	54	85	52	6.1	21	3.9
07	7	29.52	58	55	83	53	6.4	22	4.2
10	7	29.53	67	59	63	53	9.9	25	4.7
13	8	29.50	71	60	54	52	11.0	27	5.1
16	6	29.48	71	60	54	52	10.4	28	4.7
19	6	29.49	64	58	69	53	7.2	23	1.6
22	5	29.51	60	56	78	53	6.4	22	2.7

OBSERVATIONS AT 3-HOUR INTERVALS

Column key for each day's table: Hour; Sky cover (tenths); Ceiling (hund. ft.); Visibility: whole miles, 16ths mile; Weather; Dry bulb (°F); Wet bulb (°F); Rel. hum. (%); Dew pt. (°F); Wind: Dir., Speed (knots).

DAY 01

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel. hum.	Dew pt.	Wind dir.	Wind speed
01	0	UNL	6		H	73	67	71	63	21	6
04	0	UNL	5		H	70	66	81	64	21	6
07	0	UNL	2		H	71	67	81	65	21	5
10	0	UNL	3		H	82	72	61	67	27	12
13	3	UNL	3		H	86	72	50	65	28	9
16	10	100	4		H	86	69	42	60	24	8
19	10	90	3		H	79	70	62	65	29	5
22	10	60	3		H	75	68	71	65	23	5

DAY 02

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel. hum.	Dew pt.	Wind dir.	Wind speed
01	10	9	3		H	70	67	87	66	36	6
04	10	11	8			71	66	84	66	06	8
07	10	11	8			70	66	81	64	05	7
10	10	17	15			71	65	73	62	04	7
13	10	19	15			73	66	69	62	04	7
16	10	55	15			72	65	66	60	05	5
19	9	CIR	15			69	62	66	57	09	5
22	9	CIR	15			66	61	76	58	07	3

DAY 03

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel. hum.	Dew pt.	Wind dir.	Wind speed
01	4	UNL	15			62	58	81	56	07	5
04	0	UNL	12			56	55	96	55	00	0
07	7	CIR	5		H	58	57	93	56	23	2
10	10	30	7			72	65	68	61	35	2
13	5	UNL	7			79	68	56	62	36	8
16	0	UNL	7			77	66	56	60	01	9
19	2	UNL	7			70	64	73	61	07	4
22	10	CIR	8			68	65	84	63	36	3

DAY 04

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel. hum.	Dew pt.	Wind dir.	Wind speed
01	0	UNL	6		H	63	62	93	61	25	3
04	6	UNL	0	2	F	60	60	100	60	00	0
07	10	3	1	8	F	62	61	97	61	23	3
10	10	17	6		H	74	67	69	63	12	6
13	10	33	6		H	80	67	51	60	08	5
16	8	UNL	5		H	78	69	64	65	04	8
19	7	CIR	4		H	72	66	71	62	07	9
22	9	CIR	7			69	65	79	62	13	4

DAY 05

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel. hum.	Dew pt.	Wind dir.	Wind speed
01	3	UNL	6		GF	65	62	87	61	07	4
04	2	UNL	6		GF	66	63	87	62	12	6
07	8	60	5		H	70	66	81	64	14	6
10	8	UNL	5		H	80	71	62	66	19	7
13	10	33	6		H	86	72	50	65	20	10
16	10	CIR	5		H	84	71	53	65	21	11
19	10	50	6		H	79	70	62	65	21	5
22	10	90	8			74	69	79	67	21	8

DAY 06

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel. hum.	Dew pt.	Wind dir.	Wind speed
01	6	80	10			73	70	84	68	21	8
04	8	80	10			72	68	82	66	23	7
07	10	28	5		H	73	69	82	67	21	
10	8	70	4		RWH	74	72	87	70	24	[illegible]
13	9	25	6		H	83	73	63	69	25	1[illegible]
16	2	UNL	6		H	84	72	57	67	27	15
19	2	UNL	5		H	75	70	76	67	23	7
22	7	CIR	6		H	73	68	82	67	23	7

DAY 07

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel. hum.	Dew pt.	Wind dir.	Wind speed
01	7	CIR	6		H	72	69	84	67	21	7
04	10	28	4		H	71	68	84	66	21	9
07	7	CIR	4		H	73	69	82	67	21	7
10	10	28	5		H	75	72	85	70	25	7
13	10	25	4		H	79	71	67	67	28	12
16	10	90	6		H	79	70	65	66	27	7
19	10	35	10			73	66	69	62	29	5
22	10	90	12			67	63	81	61	31	3

DAY 08

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel. hum.	Dew pt.	Wind dir.	Wind speed
01	3	UNL	12			65	62	87	61	23	3
04	3	UNL	12			63	61	90	60	29	3
07	8	25	15			63	60	84	58	28	4
10	7	100	15			72	62	57	56	30	9
13	8	38	15			74	62	50	54	30	9
16	2	UNL	15			75	61	45	52	30	6
19	8	40	15			64	57	63	51	29	7
22	3	UNL	15			56	54	87	52	24	6

DAY 09

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel. hum.	Dew pt.	Wind dir.	Wind speed
01	0	UNL	10			54	53	93	52	26	7
04	0	UNL	10			50	49	93	48	23	6
07	2	UNL	7			54	53	93	52	24	7
10	5	UNL	15			65	55	52	47	28	8
13	10	38	15			64	56	61	50	27	10
16	9	80	15			64	57	65	52	27	8
19	10	70	15			59	56	84	54	26	8
22	7	46	15			56	52	75	48	30	10

DAY 10

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel. hum.	Dew pt.	Wind dir.	Wind speed
01	4	UNL	10			52	47	69	42	27	8
04	10	50	10			52	48	77	45	27	8
07	1	UNL	15			52	48	74	44	27	8
10	6	45	15			61	50	46	40	32	12
13	6	40	15			67	53	36	39	29	11
16	3	UNL	15			69	53	32	38	27	10
19	2	UNL	15			59	52	62	46	25	7
22	0	UNL	15			53	49	74	45	20	6

DAY 11

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel. hum.	Dew pt.	Wind dir.	Wind speed
01	0	UNL	10			48	46	86	44	24	4
04	7	45	10			51	48	80	45	23	6
07	9	45	15			52	48	74	44	21	7
10	10	CIR	15			67	55	44	44	27	13
13	10	45	15		RW	66	57	54	49	24	12
16	10	100	15			67	56	51	48	24	15
19	10	70	15			61	54	63	48	25	5
22	2	UNL	15			58	54	78	51	22	8

DAY 12

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel. hum.	Dew pt.	Wind dir.	Wind speed
01	0	UNL	15			52	50	90	49	23	5
04	0	UNL	12			54	52	86	50	19	8
07	10	65	10			56	52	75	48	22	8
10	5	UNL	15			71	59	49	51	25	15
13	3	UNL	12			77	61	37	49	25	19
16	0	UNL	10			76	59	33	45	24	19
19	0	UNL	10			68	57	49	48	23	10
22	0	UNL	10			65	58	65	53	22	8

DAY 13

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel. hum.	Dew pt.	Wind dir.	Wind speed
01	5	UNL	10			64	57	63	51	22	9
04	4	UNL	10			64	58	70	54	25	10
07	4	UNL	7			64	60	81	58	26	6
10	2	UNL	10			75	66	62	61	25	10
13	3	UNL	10			82	68	47	60	26	13
16	0	UNL	10			82	68	47	60	29	8
19	0	UNL	10			74	62	50	54	23	10
22	0	UNL	10			69	62	66	57	23	10

DAY 14

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel. hum.	Dew pt.	Wind dir.	Wind speed
01	6	UNL	10			65	61	81	59	22	5
04	0	UNL	8			58	56	87	54	23	3
07	0	UNL	8			62	58	78	55	22	5
10	3	UNL	8			77	65	52	58	22	6
13	9	CIR	10			84	66	37	55	20	10
16	8	UNL	10			86	67	35	55	23	10
19	9	CIR	10			72	65	66	60	09	5
22	8	CIR	10			69	63	71	59	20	5

DAY 15

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel. hum.	Dew pt.	Wind dir.	Wind speed
01	7	UNL	10			66	62	78	59	19	8
04	6	UNL	10			65	61	78	58	22	6
07	8	UNL	5		H	65	61	81	59	20	10
10	6	120	7			77	63	43	53	24	15
13	10	120	7			81	64	38	53	25	11
16	2	UNL	7			81	64	38	53	24	13
19	10	55	8			72	62	57	56	23	7
22	9	55	10			70	63	66	58	23	6

DAY 16

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel. hum.	Dew pt.	Wind dir.	Wind speed
01	10	70	10			69	62	66	57	22	9
04	7	70	10			68	61	66	56	21	11
07	10	38	7			69	61	63	56	19	9
10	10	45	5		H	73	64	62	59	23	8
13	10	120	6		H	79	66	50	59	22	13
16	10	100	6		H	77	65	52	58	23	12
19	10	80	7		RW	71	64	66	59	25	8
22	10	60	7			68	64	81	62	21	7

DAY 17

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel. hum.	Dew pt.	Wind dir.	Wind speed
01	10	46	2		RWGF	65	63	90	62	20	3
04	10	17	1	8	RF	64	63	93	62	20	3
07	10	4	1	8	RF	65	64	93	63	32	8
10	10	4	4		RF	58	56	90	55	03	11
13	10	8	6		RF	57	55	90	54	35	7
16	10	17	12		R	55	52	83	50	02	6
19	10	28	15			55	51	77	48	02	5
22	4	UNL	15			53	49	74	45	03	6

DAY 18

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel. hum.	Dew pt.	Wind dir.	Wind speed
01	3	UNL	15			49	46	83	44	00	0
04	0	UNL	12			45	44	93	43	23	1
07	8	35	15			48	46	86	44	23	2
10	7	30	15			58	52	67	47	16	3
13	6	33	15			61	52	52	43	03	11
16	6	35	15			62	52	48	42	34	8
19	2	UNL	15			53	48	72	44	12	3
22	3	UNL	15			50	47	83	45	00	0

DAY 19

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel. hum.	Dew pt.	Wind dir.	Wind speed
01	0	UNL	15			45	44	93	43	20	1
04	2	UNL	15			44	43	89	41	00	0
07	8	UNL	7			44	43	93	42	18	1
10	9	CIR	10			56	49	60	42	10	10
13	9	CIR	10			61	50	46	40	05	7
16	8	UNL	15			61	50	44	39	01	7
19	6	UNL	15			55	49	64	43	06	6
22	2	UNL	15			51	47	77	44	08	6

DAY 20

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel. hum.	Dew pt.	Wind dir.	Wind speed
01	6	55	15			49	46	80	43	10	3
04	0	UNL	15			46	44	89	43	11	5
07	0	UNL	10			48	46	86	44	12	5
10	6	CIR	10			60	53	62	47	12	7
13	9	46	15			67	54	40	42	10	9
16	2	UNL	15			68	55	41	43	16	6
19	0	UNL	15			59	52	60	45	11	7
22	0	UNL	15			54	50	75	46	16	4

DAY 21

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel. hum.	Dew pt.	Wind dir.	Wind speed
01	0	UNL	15			49	47	89	46	23	2
04	10	45	10			48	47	93	46	20	4
07	6	45	7			48	46	89	45	19	3
10	0	UNL	10			62	54	60	48	17	7
13	4	UNL	10			69	57	46	47	09	6
16	0	UNL	12			72	59	46	50	08	7
19	0	UNL	15			60	55	72	51	07	7
22	0	UNL	15			55	52	83	50	10	5

DAY 22

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel. hum.	Dew pt.	Wind dir.	Wind speed
01	0	UNL	15			50	49	93	48	00	0
04	0	UNL	7			48	46	89	45	18	3
07	0	UNL	10			52	49	80	46	20	4
10	0	UNL	10			67	57	55	50	23	7
13	0	UNL	10			76	60	37	48	11	5
16	0	UNL	12			74	62	48	53	09	10
19	0	UNL	15			64	58	68	53	09	4
22	0	UNL	15			59	53	67	48	17	4

DAY 23

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel. hum.	Dew pt.	Wind dir.	Wind speed
01	0	UNL	15			52	48	77	45	18	3
04	0	UNL	15			51	47	77	44	21	6
07	2	UNL	10			51	48	80	45	23	4
10	3	UNL	10			67	57	55	50	19	8
13	8	UNL	10			76	60	39	49	17	7
16	10	150	12			74	62	50	54	01	6
19	10	90	15			67	60	68	56	17	3
22	10	90	15			62	58	81	56	17	4

DAY 24

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel. hum.	Dew pt.	Wind dir.	Wind speed
01	8	90	15			64	58	70	54	22	7
04	10	CIR	15			61	57	78	54	19	6
07	10	15	7			62	59	86	57	19	5
10	10	4	1		RF	61	60	93	59	32	8
13	10	23	5		RF	61	59	90	58	32	7
16	10	4	2		RF	58	57	93	56	34	9
19	10	4	1	8	LF	54	53	96	53	33	9
22	10	13	4		LF	53	52	93	51	02	7

DAY 25

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel. hum.	Dew pt.	Wind dir.	Wind speed
01	10	17	12		L	52	50	86	48	02	6
04	10	38	15			52	50	86	48	02	5
07	10	15	15			52	49	83	47	03	5
10	10	19	15			54	50	75	46	01	8
13	10	19	15			54	49	72	45	01	7
16	10	38	15			54	49	72	45	36	7
19	10	46	15			52	48	77	45	06	5
22	10	33	15			52	48	77	45	09	4

DAY 26

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel. hum.	Dew pt.	Wind dir.	Wind speed
01	10	23	10			52	49	80	46	09	5
04	10	18	10			52	49	83	47	10	3
07	10	17	10			52	50	90	49	20	4
10	6	70	15			57	52	72	48	23	4
13	7	35	15			64	54	52	46	24	2
16	6	30	12			63	54	56	[illegible]	[illegible]	3
19	0	UNL	10			56	52	78	[illegible]	[illegible]	6
22	4	UNL	12			54	51	83	49	15	5

DAY 27

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel. hum.	Dew pt.	Wind dir.	Wind speed
01	0	UNL	10			52	50	86	48	19	5
04	4	UNL	10			54	52	86	50	21	7
07	9	95	7			54	52	90	51	22	6
10	10	90	15			60	53	65	48	25	10
13	9	120	15			62	53	54	45	24	13
16	10	100	15			63	56	65	51	22	8
19	5	UNL	15			56	52	78	49	21	7
22	2	UNL	15			50	48	89	47	24	5

DAY 28

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel. hum.	Dew pt.	Wind dir.	Wind speed
01	5	UNL	10			49	48	93	47	23	5
04	0	UNL	10			47	45	89	44	23	5
07	2	UNL	7			46	45	93	44	24	6
10	6	CIR	15			58	51	62	45	29	5
13	10	25	15		RW	57	53	75	49	29	10
16	8	80	15			59	50	51	41	30	13
19	9	50	15			49	47	86	45	26	6
22	2	UNL	15			46	44	83	41	29	7

DAY 29

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel. hum.	Dew pt.	Wind dir.	Wind speed
01	7	35	15			43	42	89	40	26	5
04	10	55	15			46	44	86	42	26	6
07	9	33	10			47	45	86	43	26	6
10	7	33	15			56	49	60	42	26	10
13	6	38	15			60	49	44	38	30	8
16	10	100	15			57	50	60	43	34	5
19	10	55	15			54	50	75	46	15	4
22	10	90	15			52	48	77	45	15	6

DAY 30

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel. hum.	Dew pt.	Wind dir.	Wind speed
01	10	80	15			51	47	74	43	18	6
04	10	80	15			52	48	74	44	17	6
07	10	80	15			55	48	62	42	20	7
10	10	70	15			61	52	52	43	18	13
13	10	38	15			67	57	53	49	24	17
16	8	35	15			67	58	59	52	26	12
19	10	45	10			62	56	70	52	26	10
22	3	UNL	10			52	48	77	45	23	5

NOTES

CEILING COLUMN

UNL indicates an unlimited ceiling.
CIR indicates a cirriform cloud ceiling of unknown height

WEATHER COLUMNS

- • Tornado
- T Thunderstorm
- Q Squall
- R Rain
- RW Rain showers
- ZR Freezing rain
- L Drizzle
- ZL Freezing drizzle
- S Snow
- SP Snow pellets
- IC Ice crystals
- SW Snow showers
- SG Snow grains
- E Sleet
- A Hail
- AP Small hail
- F Fog
- IF Ice fog
- GF Ground fog
- BD Blowing dust
- BN Blowing sand
- BS Blowing snow
- BY Blowing spray
- K Smoke
- H Haze
- D Dust

WIND COLUMNS

Directions are those from which the wind blows, indicated in tens of degrees from true North; i. e., 09 for East, 18 for South, 27 for West. Entry of 00 in the direction column indicates calm.

Speed is expressed in knots, multiply by 1.15 to convert to miles per hour

ADDITIONAL DATA
Other observational data contained in records on file can be furnished at cost via microfilm or microfiche copies of the original records. Inquiries as to availability and costs should be addressed to Director, National Weather Records Center, Federal Building, Asheville, N. C. 28801

STATION: ROCHESTER N Y   YEAR & MONTH: 69 09

LOCAL CLIMATOLOGICAL DATA

U.S. DEPARTMENT OF COMMERCE
MAURICE H. STANS, Secretary
ENVIRONMENTAL SCIENCE SERVICES ADMINISTRATION
ENVIRONMENTAL DATA SERVICE

ROCHESTER, NEW YORK
ROCHESTER-MONROE COUNTY AP
OCTOBER 1969

Latitude 43° 07′ N Longitude 77° 40′ W Elevation (ground) 547 ft Standard time used EASTERN

Date	Temperature (°F) Maximum	Minimum	Average	Departure from normal	Average dew point	Degree days (Base 65°) Heating	Cooling	Weather types shown by code 1-9 on dates of occurrence	Snow, Sleet, or Ice on ground at 07AM (In.)	Precipitation Water equivalent (In.)	Snow, sleet (In.)	Avg. station pressure (In.) Elev. 555 feet m.s.l.	Wind Resultant direction	Resultant speed m.p.h.	Average speed m.p.h.	Fastest mile Speed m.p.h.	Fastest mile Direction	Sunshine Hours and tenths	Percent of possible	Sky cover (Tenths) Sunrise to sunset	Midnight to midnight	Date
1	2	3	4	5	6	7A	7B	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	73	46	60	3	50	5	0	1 8	0	0	0	29.49	16	2.5	5.8	10	SE	8.2	70	6	7	1
2	69	58	64	7	56	1	0	1	0	.47	0	29.30	16	8.0	8.9	16	SW	0.0	0	10	10	2
3	68	54	61	4	60	4	0	1 8	0	.10	0	29.36	33	6.2	7.5	17	NW	0.0	0	10	9	3
4	56	50	53	-3	46	12	0		0	0	0	29.69	03	7.9	8.5	12	N	0.0	0	10	10	4
5	70	43	57	1	47	8	0		0	0	0	29.72	13	4.6	5.3	10	E	11.2	97	0	2	5
6	73	47	60	5	49	5	0		0	0	0	29.56	21	4.6	5.5	12	S	6.9	60	9	7	6
7	67	53	60	5	52	5	0	1	0	.03	0	29.41	19	7.1	7.6	17	S	0.3	3	10	9	7
8	71	46	59	4	46	6	0		0	T	0	29.42	24	10.6	12.8	28	W	5.9	52	6	5	8
9	69	38	54	-1	41	11	0		0	0	0	29.55	22	4.6	5.2	11	SE	11.4	100	0	0	9
10	77	44	61	7	44	4	0		0	0	0	29.44	18	10.0	10.2	19	S	11.0	97	1	1	10
11	81	58	70	16	53	0	5		0	T	0	29.43	19	8.9	9.5	17	S	7.4	65	7	7	11
12	67	51	59	5	53	6	0		0	0	0	29.61	36	4.0	6.9	10	NW	0.1	1	10	9	12
13	83*	50	67	14	54	0	2		0	0	0	29.35	18	6.4	9.9	23	SW	3.8	34	9	9	13
14	72	42	57	4	41	8	0		0	.02	0	29.38	28	13.3	13.8	26	W	1.8	16	9	8	14
15	57	34	46	-7	34	19	0		0	0	0	29.57	26	3.8	5.8	9	SW	10.0	90	3	3	15
16	58	38	48	-4	42	17	0	1	0	.16	0	29.26	20	7.0	9.9	26	SW	0.8	7	10	7	16
17	53	39	46	-6	38	19	0		0	.03	0	29.29	25	10.8	10.9	24	SW	1.9	17	9	9	17
18	58	38	48	-3	33	17	0		0	0	0	29.51	24	14.1	14.4	32	SW	7.8	72	4	3	18
19	55	41	48	-3	41	17	0		0	.14	0	29.54	22	7.1	7.5	17	SW	0.0	0	9	7	19
20	69	49	59	9	52	6	0		0	.18	0	29.16	24	11.3	13.2	28	SW	0.0	0	10	10	20
21	51	39	45	-5	40	20	0		0	.09	0	29.15	29	10.2	11.5	26	W	0.7	7	10	10	21
22	39	28	34	-16	28	31	0	1	0	.35	T	29.26	32	9.7	13.5	24	N	0.9	8	10	9	22
23	37	22*	30	-20	18	35	0		T	0	0	29.80	28	8.8	9.8	21	NW	8.1	76	5	4	23
24	48	28	38	-11	25	27	0		0	0	0	29.86	22	9.9	10.1	14	S	0.9	8	9	8	24
25	60	39	50	1	30	15	0		0	0	0	29.68	23	8.5	8.8	18	W	2.4	23	9	8	25
26	56	42	49	0	35	16	0		0	0	0	29.52	20	9.0	9.2	18	S	0.0	0	10	10	26
27	53	40	47	-1	34	18	0		0	.12	0	29.50	27	10.9	11.7	26	W	0.9	9	9	10	27
28	45	27	36	-12	30	29	0	8	0	T	0	29.79	31	5.3	7.6	14	NW	3.8	36	8	7	28
29	46	24	35	-12	26	30	0		0	0	0	30.01	22	1.3	3.9	9	NW	4.5	43	8	5	29
30	55	24	40	-7	29	25	0		0	0	0	29.91	09	2.3	4.8	13	NE	10.4	100	2	1	30
31	61	26	44	-2	31	21	0		0	0	0	29.69	16	4.9	5.8	16	S	6.7	65	8	7	31
	Sum 1897	Sum 1258				Total 437	Total 7			Total 1.69	Total	For the month: 29.52	24	4.7	8.9	32	SW	Total 127.8	% for month	Sum 230	Sum 211	
	Avg. 61.2	Avg. 40.6	Avg. 50.9	Dep. -0.9	Avg. 41	Dep. 22	Dep.			Dep. -0.89						Date 18		Possible 342.0	37	Avg. 7.4	Avg. 6.8	

Weather types: 1 Fog, 2 Heavy Fog, 3 Thunderstorm, 4 Sleet, 5 Hail, 6 Glaze, 7 Duststorm, 8 Smoke, Haze, 9 Blowing Snow

Number of days: Maximum Temp ≥ 90°‡	Maximum Temp ≤ 32°	Minimum Temp ≤ 32°	Minimum Temp ≤ 0°	Season to date: Heating Total	Cooling Total
0	0	7	0	591	646
				Dep 10	Dep.

Number of days	
Precipitation ≥ .01 inch	11
Snow, sleet ≥ 1.0 inch	0
Thunderstorms	0
Heavy fog X	0

Greatest in 24 hours and dates: Precipitation	Dates	Snow, Sleet	Dates	Greatest depth on ground of snow, sleet or ice and date	Date
.54	2- 3	T	22	T	23+

HOURLY PRECIPITATION (Water equivalent in inches)

Date	A.M. 1	2	3	4	5	6	7	8	9	10	11	12	P.M. 1	2	3	4	5	6	7	8	9	10	11	12	Date
1																									1
2					T	T	T	T	.19	.06	.12	.06	.02	.02	T	T									2
3						T	.01	.06	.03	T	T			T	T										3
4																									4
5																									5
6																									6
7													T		.01	T	T	T	.01	.01	T				7
8																			T	T					8
9																									9
10																									10
11																					T				11
12																									12
13																									13
14	T	.01	.01																						14
15																									15
16								T	.02	.01	T	T	T			.01	.03	.07	.02	T					16
17											T	.01	T	T	.02	T	T	T							17
18																									18
19															.02	.02	.03	.04	.03	T	T	T			19
20			T	T						.04	.04	.01		T	T	T				T	.09	T			20
21			T	.01	T	T			T	T		.02	T								T	T	.03	.03	21
22	.05	.05	.03	.02		.12	.06	T	.01	.01	T	T	T	T	T	T		T	T	T		T	T		22
23																									23
24																									24
25																									25
26																									26
27	.02	.08	.02	T	T																				27
28					T	T				T	T														28
29																									29
30																									30
31																									31

* Extreme temperatures for the month. May be the last of more than one occurrence.
– Below zero temperature or negative departure from normal.
‡ ≥ 70 at Alaskan stations.
\+ Also on an earlier date, or dates.
X Heavy fog restricts visibility to ¼ mile or less.
T In the Hourly Precipitation table and in columns 9, 10, and 11 indicates an amount too small to measure.

The season for degree days begins with July for heating and with January for cooling.
Data in columns 6, 12, 13, 14, and 15 are based on 8 observations per day at 3-hour intervals.
Wind directions are those from which the wind blows. Resultant wind is the vector sum of wind directions and speeds divided by the number of observations. Figures for directions are tens of degrees from true North; i.e., 09 = East, 18 = South, 27 = West, 36 = North, and 00 = Calm. When directions are in tens of degrees in Col. 17, entries in Col. 16 are fastest observed 1-minute speeds. If the / appears in Col. 17, speeds are gusts.

Any errors detected will be corrected and changes in summary data will be annotated in the annual summary.

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I certify that this is an official publication of the Environmental Science Services Administration, and is compiled from records on file at the National Weather Records Center, Asheville, North Carolina 28801.

William H. Haggard
Director, National Weather Records Center

SUMMARY BY HOURS
AVERAGES

Hour	Sky cover	Station pressure	Temperature	Dew point	Relative humidity	Wind direction	Wind speed	Resultant wind direction	Resultant wind speed
01	6	29.51	47	44	78	40	7.0	23	4.6
04	6	29.51	45	42	79	38	7.1	24	3.9
07	7	29.54	45	42	79	38	7.6	23	4.0
10	7	29.55	53	47	67	41	10.2	23	4.7
13	8	29.52	58	50	57	42	12.7	24	7.9
16	8	29.50	57	50	58	42	10.9	25	5.3
19	6	29.52	51	47	71	42	7.9	23	3.1
22	6	29.52	49	45	76	41	7.6	23	4.2

OBSERVATIONS AT 3-HOUR INTERVALS

DAY 01

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	0	UNL	15			50	48	89	47	20	7
04	8	38	10			52	50	86	48	24	3
07	0	UNL	5		GF	51	49	86	47	20	3
10	2	UNL	8			62	56	70	52	11	4
13	8	UNL	12			69	59	53	51	20	4
16	9	CIR	12			70	62	61	56	01	8
19	10	CIR	10			65	57	59	50	14	8
22	8	CIR	10			59	54	72	50	14	3

DAY 02

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	8	CIR	10			63	56	65	51	17	6
04	10	100	15			66	58	63	53	20	8
07	10	100	10		R	64	56	61	50	18	9
10	10	23	3		RGF	61	59	87	57	11	7
13	10	80	5		RGF	63	61	87	59	14	9
16	8	55	10			67	63	78	60	14	10
19	10	55	10			67	63	78	60	17	7
22	10	60	10			68	65	76	60	17	6

DAY 03

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	10	38	15			67	63	81	61	00	0
04	10	21	15			65	62	84	60	18	2
07	10	14	7		RW	67	64	84	62	31	4
10	10	3	0	12	LF	66	63	87	62	34	12
13	10	7	3		F	67	64	84	62	34	8
16	10	16	4		GF	67	63	78	60	31	9
19	2	UNL	5		H	58	56	90	55	26	4
22	10	17	10			60	57	84	55	36	13

DAY 04

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	8	23	15			53	52	93	51	01	7
04	10	21	15			54	52	86	50	02	8
07	10	21	15			53	51	90	50	02	8
10	10	23	15			54	48	67	43	04	6
13	10	25	15			53	47	64	41	01	8
16	10	21	15			51	47	74	43	06	7
19	10	21	15			51	47	74	43	05	7
22	10	19	15			50	46	77	43	07	8

DAY 05

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	6	20	10			46	44	86	42	15	5
04	2	UNL	10			43	42	93	41	10	4
07	0	UNL	10			45	44	89	42	13	4
10	0	UNL	10			58	52	65	46	16	5
13	0	UNL	15			66	57	59	51	16	3
16	0	UNL	15			70	61	57	54	10	7
19	2	UNL	15			59	57	87	55	11	6
22	2	UNL	15			53	50	83	48	19	3

DAY 06

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	0	UNL	10			50	48	86	46	19	3
04	0	UNL	10			47	46	93	45	23	4
07	6	UNL	10			50	48	86	46	22	6
10	10	CIR	10			59	53	65	47	21	7
13	10	CIR	10			67	58	57	51	22	7
16	10	CIR	10			69	59	55	52	25	5
19	6	CIR	10			59	56	81	53	07	2
22	10	CIR	12			56	52	73	48	17	4

DAY 07

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	10	120	15			55	51	77	48	17	4
04	4	UNL	15			53	50	80	47	18	7
07	10	120	15			54	51	80	48	19	5
10	10	120	12			61	55	70	51	18	9
13	10	120	10			66	58	63	53	18	10
16	10	28	8		RW	63	59	78	56	18	8
19	10	25	7			60	58	90	57	20	5
22	4	UNL	8			56	55	93	56	25	5

DAY 08

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	0	UNL	10			56	52	90	51	19	6
04	0	UNL	10			53	50	83	48	19	7
07	6	60	15			53	50	80	47	20	9
10	0	UNL	15			63	56	63	50	22	10
13	7	50	15			70	54	32	39	23	20
16	9	55	15			62	53	52	44	26	16
19	10	60	15		RW	53	48	72	44	30	13
22	10	70	15			48	45	77	41	25	8

DAY 09

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	6	UNL	10			45	42	77	38	22	5
04	0	UNL	10			40	38	82	35	22	4
07	1	UNL	10			42	41	89	39	22	5
10	0	UNL	15			56	49	60	42	21	6
13	0	UNL	15			65	54	49	45	22	8
16	0	UNL	15			69	53	34	39	24	6
19	0	UNL	15			54	50	75	46	36	2
22	0	UNL	15			47	45	80	43	00	0

DAY 10

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	0	UNL	15			46	43	80	40	20	4
04	3	UNL	12			46	43	77	39	16	6
07	8	UNL	15			45	43	83	40	18	4
10	0	UNL	15			68	57	49	48	19	12
13	0	UNL	15			75	59	37	47	18	16
16	0	UNL	15			77	60	35	47	19	9
19	0	UNL	10			66	55	49	46	17	9
22	3	UNL	10			62	53	56	46	19	11

DAY 11

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	0	UNL	12			60	53	62	47	20	6
04	2	UNL	12			58	53	70	48	18	8
07	3	UNL	12			58	53	70	48	18	9
10	8	UNL	15			69	59	53	51	20	10
13	8	UNL	15			77	63	43	53	18	12
16	9	100	15			80	65	42	55	19	12
19	10	80	10			71	64	68	60	31	2
22	10	75	10			68	64	90	63	18	7

DAY 12

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	10	28	10			66	64	90	63	23	6
04	10	46	12			60	57	84	55	31	5
07	10	19	15			57	55	87	53	31	8
10	10	15	15			60	56	78	53	33	10
13	10	16	15			60	55	75	52	34	6
16	10	19	15			60	55	72	51	04	5
19	8	120	10			55	52	83	50	08	4
22	6	UNL	10			51	50	93	49	06	4

DAY 13

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	10	CIR	10			52	49	83	47	08	8
04	10	120	10			50	48	86	46	10	3
07	10	120	12			51	49	86	47	10	8
10	10	CIR	15			64	59	75	56	15	6
13	7	UNL	15			81	68	49	60	22	13
16	8	UNL	15			83	68	46	60	20	8
19	8	UNL	10			74	65	60	59	18	9
22	10	CIR	10			73	64	59	58	21	14

DAY 14

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	10	18	10		RW	69	65	81	63	25	19
04	10	38	12			55	51	77	48	27	15
07	10	23	15			52	47	72	43	28	11
10	10	33	15			52	46	61	39	29	10
13	9	28	15			53	45	55	37	29	18
16	8	33	15			52	44	50	34	29	10
19	2	UNL	15			43	39	71	34	27	7
22	6	40	15			43	38	65	32	29	6

DAY 15

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	10	45	15			44	40	74	36	25	6
04	0	UNL	15			35	33	82	30	24	5
07	0	UNL	7			34	32	85	30	23	5
10	2	UNL	10			50	43	57	35	25	7
13	5	UNL	15			55	45	45	34	25	8
16	6	UNL	15			57	46	42	34	02	6
19	4	UNL	12			47	42	63	35	36	3
22	4	UNL	15			42	40	83	37	00	0

DAY 16

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	0	UNL	15			41	39	82	36	00	0
04	0	UNL	12			38	36	86	34	09	5
07	10	80	10			41	38	79	35	12	8
10	10	45	7		RW	49	46	77	42	18	13
13	10	30	10			55	50	69	45	22	18
16	10	23	8		RW	54	52	86	50	23	9
19	10	55	7		RW	54	52	86	50	24	9
22	7	70	10			51	48	83	46	24	7

DAY 17

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	9	70	12			50	46	74	42	26	8
04	10	55	15			47	43	71	38	25	9
07	10	70	15			46	42	71	37	24	7
10	10	30	15			49	43	63	37	26	12
13	8	30	15			53	46	59	39	26	14
16	9	30	12			47	43	74	39	24	13
19	8	70	15			43	40	79	37	25	7
22	7	60	15			42	39	76	35	24	6

DAY 18

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	10	70	15			45	39	58	31	25	13
04	4	UNL	15			42	37	65	31	26	7
07	7	70	15			38	36	79	32	24	7
10	1	UNL	15			52	44	53	35	26	12
13	5	UNL	15			58	48	46	37	23	20
16	3	UNL	15			56	46	47	36	24	22
19	0	UNL	15			50	42	50	32	25	11
22	0	UNL	15			47	39	50	29	22	8

DAY 19

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	0	UNL	[illegible]			45	39	60	32	23	8
04	0	UNL	15			46	41	68	36	22	7
07	5	UNL	15			44	41	76	37	23	6
10	10	100	10			52	47	66	41	20	7
13	10	100	10			55	48	62	42	23	10
16	10	35	6		R	49	47	86	45	22	6
19	10	20	7		R	48	46	89	45	17	5
22	10	45	7			50	48	89	47	22	5

DAY 20

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	10	35	10			50	49	93	48	16	6
04	10	70	15			53	50	80	47	18	6
07	6	60	15			58	52	65	46	22	11
10	10	70	4		RW	60	57	81	54	23	20
13	10	85	10			67	61	70	57	23	17
16	10	17	7			63	59	78	56	26	17
19	10	16	7			60	57	86	55	25	10
22	10	38	10			56	52	90	51	31	7

DAY 21

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	10	38	12			51	49	90	48	28	7
04	10	28	8		RW	48	46	89	45	31	9
07	10	33	12			45	44	89	42	29	7
10	10	12	10			49	46	83	44	24	8
13	10	12	10			48	44	71	39	28	20
16	9	35	15			47	41	58	33	28	17
19	10	33	15			43	39	68	33	34	8
22	10	16	7		RW	40	38	82	35	35	6

DAY 22

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	10	6	6		RW	37	35	85	33	09	8
04	10	10	8			34	33	92	32	02	7
07	10	5	2	8	RSF	36	35	89	33	35	12
10	10	6	1	4	SF	34	33	89	31	33	15
13	10	13	7		SW	34	32	79	28	31	15
16	9	35	15			34	29	57	20	29	13
19	9	38	12		SW	32	28	59	19	29	10
22	9	40	5		SW	29	28	85	25	27	14

DAY 23

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	8	46	12			28	26	72	20	27	7
04	3	UNL	12			25	23	75	18	26	5
07	7	38	12			24	23	78	18	26	7
10	4	UNL	15			36	28	46	15	32	11
13	6	40	15			34	28	46	15	30	13
16	5	UNL	15			35	29	50	18	28	11
19	1	UNL	15			28	26	75	21	24	7
22	0	UNL	15			28	26	75	21	25	7

DAY 24

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	8	90	10			29	26	69	20	23	7
04	10	90	10			34	30	66	23	24	8
07	9	55	10			33	29	66	22	23	7
10	8	70	12			37	32	62	25	20	10
13	10	40	15			45	39	56	30	22	9
16	10	55	12			47	39	50	29	22	9
19	3	UNL	15			45	37	46	25	23	8
22	4	UNL	15			43	36	47	24	22	12

DAY 25

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	10	90	10			40	33	47	21	22	7
04	10	100	10			44	36	44	23	23	6
07	10	100	10			43	36	51	26	22	7
10	10	100	7			49	41	52	32	23	6
13	9	100	7			58	47	44	36	24	10
16	8	120	10			56	46	45	35	25	11
19	3	UNL	12			45	40	63	33	25	8
22	6	100	12			45	41	68	35	21	6

DAY 26

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	10	120	10			44	39	63	32	22	7
04	10	120	10			45	39	56	30	22	8
07	10	120	10			46	40	61	33	22	5
10	10	100	12			49	41	52	32	20	6
13	10	100	8			55	46	47	35	19	8
16	10	80	8			53	46	51	37	20	6
19	10	80	10			54	46	55	38	20	10
22	7	90	10			56	47	59	40	20	14

DAY 27

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	10	33	7		RW	53	49	74	45	23	12
04	10	25	7		R	45	43	83	40	27	15
07	8	35	10			40	36	70	31	28	14
10	9	45	15			43	38	60	30	28	11
13	9	38	15			44	37	53	28	29	13
16	10	55	15			43	38	63	31	27	6
19	10	60	15			42	37	65	31	23	5
22	10	60	12			40	37	76	33	25	5

DAY 28

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	10	60	12			40	37	79	34	26	5
04	10	60	12			38	36	82	33	28	5
07	9	80	12			37	35	85	33	24	4
10	10	23	6		RWH	42	39	79	36	02	9
13	10	23	10			42	37	60	29	34	9
16	3	UNL	15			41	35	53	25	33	8
19	0	UNL	15			33	30	75	26	30	7
22	6	32	10			28	27	85	24	25	6

DAY 29

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	6	30	12			27	26	85	23	23	3
04	0	UNL	15			25	24	85	21	23	4
07	0	UNL	12			24	23	85	20	24	4
10	10	28	10			37	34	76	30	25	3
13	10	28	15			43	37	58	29	32	4
16	10	UNL	15			43	37	56	28	11	3
19	6	UNL	10			37	34	73	29	10	3
22	1	UNL	10			32	30	82	27	11	3

DAY 30

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	0	UNL	10			28	27	85	24	23	3
04	0	UNL	10			26	25	88	23	26	2
07	0	UNL	8			26	25	85	22	17	2
10	0	UNL	10			41	37	68	31	18	3
13	1	UNL	15			53	43	43	31	09	6
16	7	UNL	12			50	43	57	35	04	9
19	1	UNL	10			42	39	76	35	08	8
22	0	UNL	10			36	34	85	32	00	0

DAY 31

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	0	UNL	12			31	30	89	28	00	0
04	0	UNL	12			30	28	82	25	00	0
07	3	UNL	10			26	25	85	22	00	0
10	8	UNL	12			51	42	48	32	14	8
13	10	UNL	15			60	48	41	36	22	8
16	10	CIR	12			60	48	41	36	13	8
19	10	CIR	10			53	44	47	33	14	10
22	10	120	10			51	44	54	35	18	8

ADDITIONAL DATA
Other observational data contained in records on file can be furnished at cost via microfilm or microfiche copies of the original records. Inquiries as to availability and costs should be addressed to: Director, National Weather Records Center, Federal Building, Asheville, N. C. 28801

STATION: ROCHESTER N Y   YEAR & MONTH: 69 10

NOTES

CEILING COLUMN

UNL indicates an unlimited ceiling
CIR indicates a cirriform cloud ceiling of unknown height

WEATHER COLUMN

- • Tornado
- T Thunderstorm
- Q Squall
- R Rain
- RW Rain showers
- ZR Freezing rain
- L Drizzle
- ZL Freezing drizzle
- S Snow
- SP Snow pellets
- IC Ice crystals
- SW Snow showers
- SG Snow grains
- E Sleet
- A Hail
- AP Small hail
- F Fog
- IF Ice fog
- GF Ground fog
- BD Blowing dust
- BN Blowing sand
- BS Blowing snow
- BY Blowing spray
- K Smoke
- H Haze
- D Dust

WIND COLUMNS

Directions are those from which the wind blows, indicated in tens of degrees from true North; i. e., 09 for East, 18 for South, 27 for West. Entry of 00 in the direction column indicates calm.

Speed is expressed in knots; multiply by 1.15 to convert to miles per hour

LOCAL CLIMATOLOGICAL DATA

U.S. DEPARTMENT OF COMMERCE
MAURICE H. STANS, Secretary
ENVIRONMENTAL SCIENCE SERVICES ADMINISTRATION
ENVIRONMENTAL DATA SERVICE

ROCHESTER, NEW YORK
ROCHESTER-MONROE COUNTY AP
NOVEMBER 1969

Latitude 43° 07' N Longitude 77° 40' W Elevation (ground) 547 ft Standard time used: EASTERN

Date	Temperature (°F) Maximum	Minimum	Average	Departure from normal	Average dew point	Degree days (Base 65°) Heating	Cooling	Weather types shown by code 1-9 on dates of occurrence (1 Fog, 2 Heavy Fog X, 3 Thunderstorm, 4 Sleet, 5 Hail, 6 Glaze, 7 Duststorm, 8 Smoke, Haze, 9 Blowing Snow)	Snow, Sleet, or Ice on ground at 07AM (In.)	Precipitation Water equivalent (In.)	Snow, sleet (In.)	Avg station pressure (In.) Elev 555 feet m.s.l.	Wind Resultant direction	Resultant speed (m.p.h.)	Average speed (m.p.h.)	Fastest mile Speed (m.p.h.)	Direction	Sunshine Hours and tenths	Percent of possible	Sky cover (Tenths) Sunrise to sunset	Midnight to midnight	Date
1	2	3	4	5	6	7A	7B	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	63*	52	58	12	45	7	0		0	.08	0	29.52	17	12.9	13.7	20	S	0.0	0	10	10	1
2	58	51	55	9	51	10	0	1	0	.77	0	29.34	13	9.9	10.5	14	SE	0.0	0	10	10	2
3	55	47	51	5	48	14	0	1 8	0	.07	0	29.33	25	7.2	7.6	13	W	0.1	1	10	10	3
4	50	37	44	-1	38	21	0	1 8	0	.51	0	29.30	22	6.3	7.1	13	SW	2.1	21	9	9	4
5	47	30	39	-6	33	26	0	8	0	T	0	29.17	31	8.3	9.8	26	NW	0.0	0	9	9	5
6	47	36	42	-2	38	23	0	1	0	.36	0	29.11	33	14.5	15.0	31	NW	0.0	0	10	10	6
7	50	43	47	3	44	18	0	1	0	.07	0	29.37	35	10.6	10.9	14	NE	0.1	1	10	10	7
8	51	48	50	7	47	15	0	1	0	.17	0	29.34	01	10.0	11.4	20	N	0.0	0	10	10	8
9	49	45	47	4	46	18	0	1	0	.01	0	29.42	02	7.9	7.9	11	NE	0.0	0	10	10	9
10	49	44	47	5	44	18	0	1	0	.04	0	29.40	01	4.7	5.0	8	N	0.0	0	10	10	10
11	54	44	49	7	44	16	0	1	0	T	0	29.30	17	1.4	2.3	6	SW	0.2	2	10	10	11
12	51	35	43	1	40	22	0	1 8	0	.08	0	29.00	24	5.0	8.2	24	W	0.0	0	10	8	12
13	44	31	38	-4	30	27	0		0	.01	0	29.11	22	6.1	8.3	18	SW	2.8	29	8	6	13
14	44	34	39	-2	34	26	0	1	0	.58	1.0	28.89	22	4.3	11.1	23	W	0.0	0	10	10	14
15	35	25	30	-11	21	35	0		T	T	T	29.12	24	13.3	14.2	25	SW	6.1	63	7	7	15
16	38	25	32	-8	25	33	0		T	T	.2	29.64	21	7.9	8.9	17	W	5.8	60	6	7	16
17	50	30	40	0	27	25	0		T	.02	0	29.79	17	9.4	9.9	15	S	5.1	53	8	8	17
18	57	42	50	11	38	15	0		0	.22	0	29.67	16	8.6	8.8	14	SE	0.0	0	10	10	18
19	60	33	47	8	40	18	0	1	0	.15	T	29.27	21	13.5	17.7	40	SW	0.0	0	10	10	19
20	35	26	31	-7	23	34	0		0	.01	.1	29.44	26	13.0	14.2	24	W	2.8	29	8	8	20
21	29	19*	24	-14	17	41	0		1	.01	.9	29.68	26	10.1	10.9	17	W	4.3	45	6	6	21
22	41	20	31	-6	20	34	0		T	0	0	29.59	18	6.2	7.2	13	S	3.1	33	10	8	22
23	49	32	41	4	33	24	0	1 8	T	.02	0	29.50	28	5.1	5.8	16	SW	0.5	5	10	9	23
24	40	25	33	-4	24	32	0		0	0	0	29.81	32	6.5	8.1	16	NW	9.1	97	1	2	24
25	53	24	39	3	28	26	0		0	T	0	29.64	20	8.0	8.6	18	SW	8.7	93	4	6	25
26	43	27	35	-1	30	30	0		0	.02	0	29.67	27	9.0	9.9	22	W	1.9	20	8	7	26
27	35	28	32	-4	26	33	0	1 8	0	T	T	29.77	07	2.1	7.1	13	NE	0.2	2	10	9	27
28	41	26	34	-1	26	31	0		T	T	T	29.68	21	3.5	6.3	15	W	2.6	28	8	7	28
29	37	28	33	-2	26	32	0		0	T	T	29.45	23	8.1	8.9	16	SW	0.0	0	10	10	29
30	35	28	32	-2	26	33	0		T	.22	3.6	29.10	23	7.5	8.9	17	SW	0.0	0	10	9	30
	Sum 1390	Sum 1015				Total 727	Total 0			Total 3.42	Total 5.8	For the month: 29.41	24	3.6	9.5	40	SW	Total 55.5	% for month	Sum 262	Sum 255	
	Avg. 46.3	Avg. 33.8	Avg. 40.1	Dep. 0.0	Avg. 34	Dep. -10	Dep.			Dep. 0.91						Date	19	Possible 292.1	19	Avg. 8.7	Avg. 8.5	

Number of days: Precipitation ≥ .01 inch 20; Snow, sleet ≥ 1.0 inch 2; Thunderstorms 0; Heavy fog X 0

Season to date: Total 1328, Dep. [illegible]; Total 646, Dep. 0

Number of days			
Maximum Temp. ≥ 32°	Maximum Temp. ≥ 90° ‡	Minimum Temp. ≤ 32°	Minimum Temp. ≤ 0°
1	0	16	0

Greatest in 24 hours and dates: Precipitation .81, 1- 2; Snow, Sleet 3.6, 30

Greatest depth on ground of snow, sleet or ice and date: 3, 30

HOURLY PRECIPITATION (Water equivalent in inches)

Date	A.M. Hour ending at 1	2	3	4	5	6	7	8	9	10	11	12	P.M. Hour ending at 1	2	3	4	5	6	7	8	9	10	11	12	Date
1								T	.01	.03	T						T	T	T	.01	T	.01	.01	.01	1
2	.03	.06	.08	.09	.05	.04	.05	.11	.06	.02	.08	.06	.02	T	T	T	.02	T					T	T	2
3	.01	T	.01	.01	T								T	.02	.01	T	T	T				T	T	.01	3
4	.14	.17	.12	.05	.01	.02	T	T																	4
5										T	T														5
6			.05	.06	.04	.05	.05	.04	.04	.02	T				T									.01	6
7	.01	T		T	T	T	T	.03	T	T		T	T								T	.02	T	.01	7
8	T	T	.01	.01	T	T				.02	.01	.02	.02	.02	.03	T	.01	.01	T	.01	T	T	T	T	8
9									T	T	T	T	T	T	T	T	T	T	T	T	T	T	.01	T	9
10	T	.01	T	T	T	T	T	.01	T	T	T	.01	T	T	T	T	.01	T	T	T	T	T	T	T	10
11	T															T									11
12					.01	.04	.01	T	T	T	T	.01	.01	T	T		T	T							12
13														T			T							.01	13
14	.05	.03	T		T		T	T	T	T	T	.02	.05	.08	.07	.08	.05	.03	.09	.01	.01	.01	T	T	14
15	T											T	T	T	T										15
16				T	T	T	T	T	T	T	T	T	T	T											16
17																						T	T	.02	17
18	.05	.06	.08	.02	T			T	.01	T															18
19											T	T	T	T	T	.11	.01	.01	.01	T	T	T	.01	T	19
20	T	T	.01	T	T	T	T	T	T	T					T	T	T	T	T	T	T	T			20
21			T	.01	T	T	T	T	T	T	T	T	T												21
22																									22
23															T	T	T	T	T	T	.01	T	.01	T	23
24																									24
25																				T	T	T	T		25
26							.02	T																	26
27										T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	27
28	T	T	T	T	T	T	T	T	T	T															28
29												T	T	T	T	T	T	T	T	T		T	T	T	29
30	T	T								T	.01	.02	.02	.02	T	.02	.03	.03	.02	.03	T	T	.01	.01	30

* Extreme temperatures for the month. May be the last of more than one occurrence.
– Below zero temperature or negative departure from normal.
‡ ≥ 70° at Alaskan stations.
+ Also on an earlier date, or dates.
X Heavy fog restricts visibility to ¼ mile or less.
T In the Hourly Precipitation table and in columns 9, 10, and 11 indicates an amount too small to measure.

The season for degree days begins with July for heating and with January for cooling.
Data in columns 6, 12, 13, 14, and 15 are based on 8 observations per day at 3-hour intervals.
Wind directions are those from which the wind blows. Resultant wind is the vector sum of wind directions and speeds divided by the number of observations. Figures for directions are tens of degrees from true North; i.e., 09 = East, 18 = South, 27 = West, 36 = North, and 00 = Calm. When directions are in tens of degrees in Col. 17, entries in Col. 16 are fastest observed 1-minute speeds. If the / appears in Col. 17, speeds are gusts.

Any errors detected will be corrected and changes in summary data will be annotated in the annual summary.

Subscription Price: Local Climatological Data $1.00 per year including annual Summary if published. Single copy: 10 cents for monthly Summary; 15 cents for annual Summary. Checks or money orders should be made payable and remittances and correspondence should be sent to the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.

I certify that this is an official publication of the Environmental Science Services Administration, and is compiled from records on file at the National Weather Records Center, Asheville, North Carolina 28801.

William H. Haggard
Director, National Weather Records Center

SUMMARY BY HOURS

Hour (Local time)	AVERAGES Sky cover (In tenths)	Station pressure (In.)	Dry bulb (°F)	Wet bulb (°F)	Rel. hum. %	Dew point (°F)	Wind speed (m.p.h.)	Resultant wind Direction	Speed (m.p.h.)
01	8	29.43	39	37	82	34	8.0	23	4.0
04	9	29.42	38	36	81	33	8.5	24	3.2
07	9	29.43	38	36	81	33	8.7	22	3.2
10	9	29.43	42	38	75	34	10.2	23	4.3
13	9	29.39	44	40	71	35	11.9	23	4.1
16	7	29.39	43	39	72	34	10.8	26	3.9
19	8	29.41	40	37	78	34	9.0	24	2.7
22	8	29.41	39	37	80	33	8.6	25	3.6

OBSERVATIONS AT 3-HOUR INTERVALS

DAY 01

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	10	120	10			53	47	62	40	17	13
04	10	46	10			55	49	64	43	20	12
07	10	100	8			55	50	69	45	18	13
10	10	46	8		RW	55	51	77	48	18	11
13	10	100	12			61	53	58	46	17	14
16	10	55	12			59	51	58	44	15	13
19	10	50	10		R	57	50	62	44	15	10
22	10	45	10		R	53	49	77	46	13	9

DAY 02

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	10	45	8		R	55	51	75	47	16	11
04	10	45	5		RGF	52	51	93	50	13	9
07	10	55	6		R	51	49	90	48	12	9
10	10	55	6		R	53	51	90	50	15	8
13	10	28	8		R	55	54	93	53	11	8
16	10	33	10			58	55	84	53	11	15
19	10	35	12			56	54	90	53	11	7
22	10	25	12			56	54	90	53	13	6

DAY 03

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	10	7	5		RF	54	53	93	52	25	7
04	10	9	4		LF	52	51	93	50	26	8
07	10	33	5		GF	51	49	86	47	26	7
10	10	70	5		H	54	51	80	48	23	9
13	10	70	5		RWH	54	50	75	46	25	11
16	10	65	3		RWGF	51	49	90	48	23	3
19	10	55	6		H	50	48	86	46	19	3
22	10	30	5		RWH	48	46	89	45	28	5

DAY 04

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	10	13	1	8	RWF	48	46	89	45	25	4
04	10	28	4		RF	45	44	89	42	23	8
07	10	20	7		R	46	42	86	40	20	4
10	6	25	5		H	47	43	74	39	21	11
13	10	33	7			50	44	64	38	23	10
16	10	60	7			48	42	59	34	25	6
19	7	80	12			42	38	68	32	15	3
22	7	100	12			38	36	79	32	17	3

DAY 05

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	7	90	10			35	33	82	30	24	5
04	8	90	10			34	32	85	30	00	0
07	1	UNL	7			30	29	89	27	23	5
10	10	13	5		RWH	40	39	89	37	27	3
13	10	38	10			47	42	66	36	33	11
16	10	CIR	8			46	41	68	36	31	13
19	10	50	8			45	41	68	35	32	12
22	10	28	12			43	38	65	32	33	19

DAY 06

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	10	25	10			42	39	73	34	32	17
04	10	10	4		R	38	37	89	35	32	17
07	10	10	4		R	39	38	89	36	33	13
10	10	11	10		R	41	40	89	38	32	13
13	10	16	15			45	43	83	40	36	13
16	10	17	15			45	43	83	40	35	10
19	10	13	15			44	42	83	39	34	12
22	10	9	15			44	42	86	40	32	9

DAY 07

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	10	9	10		RW	44	43	89	41	33	10
04	10	9	10		RW	44	43	89	41	34	11
07	10	6	5		RWF	45	44	93	43	01	8
10	10	7	7			46	44	89	43	02	9
13	10	9	7			48	46	86	44	30	9
16	10	8	4		F	49	47	86	45	36	8
19	10	9	5		F	49	47	86	45	35	10
22	10	8	2		RF	49	47	89	46	35	11

DAY 08

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	10	10	7			49	47	89	46	35	8
04	10	10	4		RF	50	49	93	48	36	10
07	10	12	8			50	48	89	47	36	12
10	10	7	4		RF	48	47	93	46	36	12
13	10	6	1		RF	49	48	93	47	02	10
16	10	7	7			50	48	89	47	02	11
19	10	4	5		RF	50	48	89	47	05	11
22	10	9	6		RF	49	47	89	46	09	9

DAY 09

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	10	7	7			47	46	93	45	02	3
04	10	15	7			48	47	93	46	03	5
07	10	7	5		F	48	46	89	45	04	6
10	10	5	2	8	RF	49	48	93	47	03	10
13	10	6	2		RF	48	47	93	46	02	8
16	10	7	7		L	49	47	89	46	02	8
19	10	6	6		LF	48	47	93	46	02	8
22	10	4	1	8	LF	48	47	93	46	02	7

DAY 10

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	10	4	2		LF	47	46	96	46	34	5
04	10	6	2		LF	47	46	93	45	36	5
07	10	4	1		LF	46	45	93	44	36	6
10	10	7	2	8	RF	46	45	93	44	01	5
13	10	6	2		RF	46	44	89	43	05	5
16	10	5	0	12	RF	45	44	93	43	04	4
19	10	6	5		RF	45	44	89	42	36	3
22	10	5	4		LF	45	44	89	42	02	2

DAY 11

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	10	5	1	8	F	44	43	93	42	00	0
04	10	4	2		F	44	43	93	42	16	1
07	10	7	2		F	44	43	93	42	17	1
10	10	14	10			47	45	83	42	14	4
13	7	35	10			52	49	80	46	03	2
16	10	47	4		GF	50	48	89	47	24	3
19	10	33	4		GF	48	47	93	46	19	3
22	10	46	5		GF	48	47	93	46	14	2

DAY 12

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	10	31	4		GF	45	44	93	43	20	2
04	10	75	7			45	44	89	42	12	2
07	10	35	5		RW	46	44	89	43	13	6
10	10	21	4		RWH	48	45	83	43	21	8
13	10	19	2	8	RWF	49	47	89	46	20	9
16	10	CIR	4		H	49	46	80	43	28	11
19	10	35	15			44	40	71	35	29	13
22	0	UNL	15			38	34	67	28	26	6

DAY 13

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	0	UNL	15			34	31	70	25	25	7
04	0	UNL	15			32	30	75	25	25	6
07	7	85	15			36	34	85	32	22	9
10	4	UNL	15			42	35	47	23	23	11
13	10	80	15			41	38	76	34	23	8
16	10	25	10			40	37	79	34	23	6
19	0	UNL	15			37	35	85	33	11	7
22	10	CIR	15			38	36	79	32	13	4

DAY 14

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	10	14	10		R	40	38	82	35	15	11
04	10	35	12			40	37	79	34	16	6
07	10	23	12		R	42	38	68	32	16	9
10	10	25	10		R	43	39	73	35	16	10
13	10	16	5		R	42	40	83	37	14	4
16	10	10	2	8	RF	39	38	89	36	31	7
19	10	5	2		SF	34	33	92	32	29	13
22	10	7	1	8	SF	34	33	89	31	28	17

DAY 15

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	10	70	12			34	32	82	29	25	10
04	9	80	15			31	29	82	26	26	14
07	10	80	15			30	28	78	24	25	11
10	7	80	15			30	27	69	21	27	13
13	6	25	10		SW	31	27	64	20	23	15
16	8	90	10			28	25	63	17	22	15
19	0	UNL	15			26	23	66	16	21	14
22	2	UNL	15			25	23	69	16	21	7

DAY 16

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	5	UNL	15			26	24	72	18	20	9
04	10	33	15		SW	29	27	72	21	20	7
07	10	38	2		SW	30	28	78	24	21	8
10	7	25	4		SW	33	31	79	27	21	8
13	7	90	10		SW	37	33	67	27	26	10
16	2	UNL	15			37	32	57	23	23	8
19	10	38	15			35	33	79	29	19	6
22	2	UNL	15			33	31	82	28	16	6

DAY 17

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	5	UNL	15			32	30	79	26	18	5
04	6	UNL	15			33	30	72	25	13	7
07	8	UNL	15			33	30	70	24	13	5
10	7	120	15			43	37	53	27	17	7
13	9	CIR	15			48	40	48	29	18	13
16	10	120	15			49	41	48	30	17	10
19	10	90	15			48	40	48	29	18	12
22	10	75	15		RW	48	40	48	29	18	10

DAY 18

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	10	46	8		RW	43	40	76	36	18	8
04	10	46	8		R	43	40	79	37	16	8
07	10	70	10			44	41	76	37	14	7
10	10	35	7			48	43	68	38	16	8
13	10	55	7			52	45	59	38	17	8
16	10	90	7			55	48	57	40	16	8
19	10	70	15			53	46	57	38	16	7
22	10	70	15			51	46	66	40	17	7

DAY 19

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	10	70	15			52	47	69	42	17	10
04	10	70	15			53	47	66	42	17	12
07	10	30	15			55	49	64	43	18	13
10	10	70	12			58	52	65	46	18	14
13	10	55	12		R	58	52	67	47	17	20
16	10	17	7		R	46	44	83	41	25	24
19	10	19	7		RWSW	37	35	85	33	24	13
22	8	38	15			35	32	70	26	27	17

DAY 20

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	10	33	7		SW	33	32	85	29	23	7
04	10	28	12		SW	32	30	79	26	25	6
07	10	38	12		SW	31	28	69	22	22	12
10	8	20	8			32	29	72	24	25	18
13	7	25	15			31	28	69	22	25	18
16	8	20	15		SW	33	29	59	20	30	19
19	10	19	5		SW	29	27	75	22	27	10
22	4	UNL	15			27	26	81	22	26	9

DAY 21

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	3	UNL	10			26	25	81	21	24	11
04	7	25	4		SW	24	23	81	19	25	10
07	8	28	7		SW	23	22	85	19	26	8
10	6	25	10			26	24	75	19	30	9
13	6	25	15			28	25	61	16	28	13
16	3	UNL	15			27	23	58	14	29	11
19	7	38	10			23	21	71	15	23	6
22	4	UNL	10			20	19	77	14	25	8

DAY 22

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	0	UNL	10			20	19	77	14	24	6
04	8	100	10			25	23	75	18	19	7
07	9	CIR	10			23	21	74	16	17	6
10	10	70	10			29	25	61	17	19	8
13	10	CIR	10			37	31	48	19	17	8
16	9	CIR	15			40	34	55	25	13	5
19	0	UNL	15			34	31	73	26	16	5
22	6	UNL	15			37	33	67	27	23	5

DAY 23

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	0	UNL	15			34	31	76	27	36	3
04	8	UNL	12			33	31	82	28	29	3
07	10	120	10			33	32	85	29	00	0
10	9	100	5		H	40	37	79	34	20	1
13	10	31	6		H	48	42	61	35	25	8
16	10	21	4		RWH	43	40	79	37	28	9
19	10	23	4		RWGF	40	38	86	36	28	7
22	10	8	2	8	RWGF	39	38	89	36	27	9

DAY 24

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	10	38	7			36	34	82	31	31	8
04	6	35	10			33	30	72	25	32	11
07	3	UNL	10			30	28	78	24	28	7
10	3	UNL	12			36	32	64	25	31	11
13	0	UNL	15			40	33	45	20	36	7
16	0	UNL	15			37	32	57	23	01	5
19	0	UNL	15			29	28	82	24	32	6
22	0	UNL	15			27	26	81	22	17	3

DAY 25

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	6	UNL	15			26	25	88	23	16	3
04	6	120	15			27	26	81	22	19	4
07	3	UNL	15			27	26	81	22	17	4
10	3	UNL	10			39	35	67	29	18	10
13	2	UNL	12			52	42	43	30	20	15
16	6	UNL	15			50	41	46	30	19	8
19	10	CIR	12			43	37	58	29	23	6
22	10	25	10		RW	45	43	83	40	23	10

DAY 26

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	10	33	8			39	38	89	36	25	6
04	10	46	7			36	35	92	34	23	6
07	10	12	8		RW	39	37	86	35	28	13
10	7	35	15			40	36	68	30	29	15
13	9	38	15			41	35	55	26	28	12
16	5	UNL	15			38	33	60	25	30	8
19	2	UNL	10			31	29	78	25	22	4
22	8	40	10			32	30	82	27	24	9

DAY 27

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	5	UNL	10			30	28	78	24	24	6
04	1	UNL	15			30	28	78	24	21	3
07	10	CIR	15			30	28	82	25	23	5
10	10	33	6		SH	34	31	76	27	31	3
13	10	7	2	8	SGF	33	32	89	30	06	15
16	10	11	6		S	31	30	85	27	05	7
19	10	25	5		S	32	30	79	26	07	6
22	10	25	6		S	32	30	82	27	14	4

DAY 28

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	10	46	7		S	32	30	82	27	00	0
04	10	25	7		S	32	30	75	25	10	6
07	10	18	7		SW	32	29	72	24	09	4
10	10	28	8			33	30	70	24	16	3
13	7	23	7			40	36	65	29	24	12
16	9	33	7			39	34	62	27	25	8
19	3	UNL	15			32	30	79	26	23	6
22	0	UNL	15			31	29	82	26	18	5

DAY 29

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	10	33	12			30	29	89	27	16	8
04	10	33	12			35	31	64	24	21	8
07	10	28	12			35	32	70	26	23	7
10	10	28	7			36	32	64	25	21	7
13	10	25	3		SW	35	32	70	26	23	8
16	10	25	5		SW	35	32	73	27	25	10
19	10	55	15			33	31	82	28	23	7
22	10	38	15		SW	33	31	79	27	25	9

DAY 30

Hour	Sky cover (tenths)	Ceiling (hnds of ft)	Visibility whole miles	Visibility 16ths	Weather	Dry bulb (F)	Wet bulb (F)	Rel hum (%)	Dew pt (F)	Wind dir	Wind speed (knots)
01	10	33	7		SW	34	32	85	30	26	8
04	8	45	10			31	28	72	23	26	9
07	10	40	10			30	27	66	20	26	9
10	10	15	1	8	SW	30	28	75	23	24	6
13	10	8	1		SW	31	29	82	26	16	7
16	10	10	1		SW	32	30	82	27	20	10
19	10	17	1	8	S	32	31	85	28	22	7
22	10	17	2		S	32	31	85	28	21	6

NOTES

CEILING COLUMN

UNL indicates an unlimited ceiling.
CIR indicates a cirriform cloud ceiling of unknown height.

WEATHER COLUMN

- • Tornado
- T Thunderstorm
- Q Squall
- R Rain
- RW Rain showers
- ZR Freezing rain
- L Drizzle
- ZL Freezing drizzle
- S Snow
- SP Snow pellets
- IC Ice crystals
- SW Snow showers
- SG Snow grains
- E Sleet
- A Hail
- AP Small hail
- F Fog
- IF Ice fog
- GF Ground fog
- BD Blowing dust
- BN Blowing sand
- BS Blowing snow
- BY Blowing spray
- K Smoke
- H Haze
- D Dust

WIND COLUMNS

Directions are those from which the wind blows, indicated in tens of degrees from true North, i.e., 09 for East, 18 for South, 27 for West. Entry of 00 in the direction column indicates calm.

Speed is expressed in knots; multiply by 1.15 to convert to miles per hour.

ADDITIONAL DATA
Other observational data contained in records on file can be furnished at cost via microfilm or microfiche copies of the original records. Inquiries as to availability and costs should be addressed to Director, National Weather Records Center, Federal Building, Asheville, N. C. 28801

STATION: ROCHESTER N Y YEAR & MONTH: 69 11

LOCAL CLIMATOLOGICAL DATA

U.S. DEPARTMENT OF COMMERCE
MAURICE H. STANS, Secretary
ENVIRONMENTAL SCIENCE SERVICES ADMINISTRATION
ENVIRONMENTAL DATA SERVICE

ROCHESTER, NEW YORK
ROCHESTER-MONROE COUNTY AP
DECEMBER 1969

Latitude 43 07' N Longitude 77 40' W Elevation (ground) 547 ft Standard time used EASTERN

Date	Temperature (°F): Maximum	Minimum	Average	Departure from normal	Average dew point	Degree days (Base 65°): Heating	Cooling	Weather types shown by code 1-9 on dates of occurrence (1 Fog, 2 Heavy Fog X, 3 Thunderstorm, 4 Sleet, 5 Hail, 6 Glaze, 7 Duststorm, 8 Smoke, Haze, 9 Blowing Snow)	Snow, Sleet, or Ice on ground at 07AM (In.)	Precipitation: Water equivalent (In.)	Snow, sleet (In.)	Avg. station pressure (In.) Elev 555 feet m.s.l.	Wind: Resultant direction	Resultant speed (m.p.h.)	Average speed (m.p.h.)	Fastest mile: Speed (m.p.h.)	Direction	Sunshine: Hours and tenths	Percent of possible	Sky cover (Tenths): Sunrise to sunset	Midnight to midnight	Date
1	2	3	4	5	6	7A	7B	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	36	25	31	-3	25	34	0	9	4	.39	6.2	29.03	32	9.4	12.7	23	N	0.0	0	10	10	1
2	37	3	20	-14	16	45	0		9	T	.2	29.17	22	6.6	9.9	17	SW	2.1	23	9	9	2
3	37	19	28	-5	21	37	0		8	T	1.3	28.88	29	11.5	12.4	22	NW	3.0	33	8	9	3
4	27	18	23	-10	18	42	0	9	8	.11	3.8	29.30	29	11.4	12.1	19	NW	0.1	1	10	10	4
5	29	11	20	-12	17	45	0		9	T	.1	29.62	29	11.0	11.7	17	NW	3.8	41	8	6	5
6	31	10	21	-11	13	44	0		8	0	0	29.71	22	2.7	4.9	11	SW	8.2	90	5	5	6
7	40	18	29	-2	21	36	0	6	7	.46	T	29.52	11	10.9	11.2	19	SE	0.0	0	10	8	7
8	43*	36	40	9	34	25	0	2	5	T	0	29.44	17	4.0	7.6	17	SE	0.0	0	10	10	8
9	42	28	35	5	29	30	0	1 8	2	0	0	29.63	20	1.7	4.5	8	W	3.2	35	9	6	9
10	38	26	32	2	28	33	0	1 8	1	1.00	0	29.48	09	7.2	7.8	21	NE	0.0	0	10	7	10
11	40	36	38	8	34	27	0	1	0	.13	T	28.89	25	12.7	17.3	28	SW	0.1	1	10	9	11
12	40	33	37	7	28	28	0		0	.01	T	29.37	26	12.1	12.2	18	SW	0.7	8	9	8	12
13	34	29	32	3	22	33	0		0	T	.1	29.44	23	6.7	9.8	15	SW	0.8	9	9	10	13
14	34	31	33	4	27	32	0	1 8	T	.01	.1	29.10	08	5.9	7.5	15	N	0.0	0	10	10	14
15	34	26	30	1	24	35	0		1	.05	1.7	29.32	32	8.7	10.4	15	N	0.0	0	10	10	15
16	28	23	26	-2	17	39	0		1	.04	2.0	29.58	29	10.4	10.8	17	W	1.3	14	8	9	16
17	33	26	30	2	21	35	0		3	.01	.6	29.68	29	7.2	8.1	14	NW	2.1	23	8	9	17
18	34	26	30	2	24	35	0	1 6 8	1	.17	2.2	29.46	18	7.0	7.8	14	S	0.0	0	10	10	18
19	34	26	30	2	25	35	0		4	.14	4.6	29.21	28	12.6	13.8	25	W	1.0	11	10	9	19
20	28	20	24	-3	16	41	0		7	.01	.5	29.42	28	11.5	12.5	20	W	3.6	40	8	9	20
21	34	27	31	4	18	34	0		7	T	.1	29.29	19	8.1	9.1	19	SW	0.9	10	10	10	21
22	33	13	23	-4	20	42	0	1 8	7	.15	.9	29.11	30	8.9	11.7	22	NW	2.5	24	9	10	22
23	13	7	10	-17	5	55	0		6	T	.8	29.38	06	3.9	7.8	13	E	0.0	0	10	10	23
24	16	-3	7	-20	7	58	0	9	7	.08	4.0	29.62	31	2.5	6.5	12	N	0.3	3	10	9	24
25	19	-5*	7	-20	4	58	0		9	T	.4	29.64	13	5.6	7.6	14	SE	0.0	0	10	9	25
26	27	17	22	-4	18	43	0	9	8	.57	7.7	29.28	02	9.4	12.9	24	N	0.0	0	10	10	26
27	24	17	21	-5	16	44	0	9	14	.03	.5	29.19	30	20.8	21.1	30	NW	1.9	21	9	8	27
28	26	13	20	-6	12	45	0		13	0	0	29.46	29	17.0	17.5	27	NW	9.0	100	0	0	28
29	24	4	14	-12	10	51	0		11	0	0	29.55	22	2.8	6.0	11	SW	7.3	81	2	4	29
30	30	24	27	1	20	38	0	8	10	0	0	29.41	06	7.5	7.8	17	NE	0.2	2	10	10	30
31	25	0	13	-13	16	52	0	9	11	.30	4.2	29.32	04	7.2	9.4	22	NE	0.0	0	10	7	31
	Sum 970	Sum 584				Total 1231	Total 0			Total 3.66	Total 42.0	For the month: 29.37	29	4.0	10.4	30	NW	Total 52.1	% for month	Sum 271	Sum 260	
	Avg. 31.3	Avg. 18.8	Avg. 25.1	Dep. -3.5	Avg. 19	Dep 106	Dep			Dep 1.28						Date 27		Possible 280.9	19	Avg. 8.7	Avg. 8.4	

Number of days: Maximum Temp ≥ 32°	Maximum Temp ≥ 90° ‡	Minimum Temp ≤ 32°	Minimum Temp ≤ 0°
14	0	28	3

Season to date: Heating Total	Cooling Total
2559	646
Dep 106	Dep

Number of days	
Precipitation ≥ .01 inch	18
Snow, sleet ≥ 1.0 inch	10
Thunderstorms	0
Heavy fog X	1

Greatest in 24 hours and dates: Precipitation	Dates	Snow, Sleet	Dates	Greatest depth on ground of snow, sleet or ice and date	Date
1.13	10-11	7.9	26-27	14	28+

HOURLY PRECIPITATION (Water equivalent in inches)

Date	A.M. 1	2	3	4	5	6	7	8	9	10	11	12	P.M. 1	2	3	4	5	6	7	8	9	10	11	12	Date
1	T	.02	.02	T	T		T	T	T	.01	.02	.02	.05	.03	.03	.04	.03	.02	.03	.03	.02	.01	.01	T	1
2	T	T	T	T	T	T	T											T	T	T	T	T	T		2
3				T	T	T	T	T	T	T	T		T			T	T	T	T	T	T	T	T	T	3
4	T	T	.01	.01	T	T	.01	T	.01	T	.01	.01	.01	T	.01	.02	.01	T	T	T	T	T	T	T	4
5	T	T	T	T	T	T	T	T	T	T	T														5
6																									6
7														T	.05	.03	.03	.05	.19	.08	.03				7
8															T	T	T	T	T	T	T	T	T		8
9																									9
10																	T	.04	.09	.10	.15	.28	.22	.12	10
11	.03	.01	.03	.02	.02	.01	T	.01	T					T	T	T	T	T							11
12							T	T	T	.01	T		T	T	T				T	T	T				12
13															T						T	T	T	T	13
14	T	T	T	T						T	T	T	T	T	T	.01	T	T	T	T	T	T	T	T	14
15	T	.03	.01	T	T	T	T	T	T	T	T	T	T	.01	T	T	T	T	T	T	T	T	T	T	15
16	T	T	T	T	T	T	T	.02	.01	.01	T	T	T	T	T	T	T	T	T	T	T	T	T	T	16
17	T	T	T	T	T	T	T	T	T	.01	T	T	T	T				T	T	T					17
18						T	T		T	T				T	.01	.03	.01	.04	T	T	.03	.01	.02	.02	18
19	T	.01	.02	.01	T	T	T	T	T	.01	.01	.02	.03	T		.01	.01	.01	T	T	T				19
20	T	T	T	T	T	T	T	T	T	.01	T	T	T	T	T		T	T	T	T					20
21		T	T			T	T	T												T	T	T	T	T	21
22	.02	.03	.04	.01	.03	.02	T	T	T												T	T	T	T	22
23	T	T	T	T	T	T	T	T	T	T	T				T	T	T	T	T	T	T	T	T	T	23
24	T	.01	.01	.01	.01	T	T	T	.01	.01	.01	.01	T	T	T	T	T		T	T	T	T	T	T	24
25	T	T														T	T	T	T	T	T	T	T	T	25
26	T	T	.01	.01	.01	.01	.01	.03	.02	.02	.03	.03	.03	.03	.04	.04	.06	.04	.03	.04	.04	.02	.01	.01	26
27	T	.02	.01	T	T	T	T	T	T																27
28																									28
29																									29
30																									30
31			T	T	.02	.08	.05	.05	.03	.02	.04	.01	T	T	T	T									31

- * Extreme temperatures for the month. May be the last of more than one occurrence.
- – Below zero temperature or negative departure from normal.
- ‡ ≥ 70° at Alaskan stations.
- \+ Also on an earlier date, or dates.
- X Heavy fog restricts visibility to ¼ mile or less.
- T In the Hourly Precipitation table and in columns 9, 10, and 11 indicates an amount too small to measure.

The season for degree days begins with July for heating and with January for cooling.
Data in columns 6, 12, 13, 14, and 15 are based on 8 observations per day at 3-hour intervals.
Wind directions are those from which the wind blows. Resultant wind is the vector sum of wind directions and speeds divided by the number of observations. Figures for directions are tens of degrees from true North; i.e., 09 = East, 18 = South, 27 = West, 36 = North, and 00 = Calm. When directions are in tens of degrees in Col. 17, entries in Col. 16 are fastest observed 1-minute speeds. If the / appears in Col 17, speeds are gusts.

Any errors detected will be corrected and changes in summary data will be annotated in the annual summary.

Subscription Price: Local Climatological Data $1.00 per year including annual Summary if published. Single copy: 10 cents for monthly Summary; 15 cents for annual Summary. Checks or money orders should be made payable and remittances and correspondence should be sent to the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.

I certify that this is an official publication of the Environmental Science Services Administration, and is compiled from records on file at the National Weather Records Center, Asheville, North Carolina 28801.

William H. Haggard
Director, National Weather Records Center

SUMMARY BY HOURS

Hour (Local time)	Sky cover (In tenths)	Station pressure (In.)	Dry bulb °F	Wet bulb °F	Rel. hum. %	Dew point °F	Wind speed (m.p.h.)	Resultant wind: Direction	Speed (m.p.h.)
01	8	29.34	25	24	80	20	9.3	26	2.8
04	8	29.35	25	23	81	20	9.1	28	4.1
07	9	29.37	24	22	81	19	9.1	28	4.6
10	9	29.40	26	24	76	19	10.8	28	4.4
13	9	29.36	28	25	71	20	13.7	30	6.4
16	8	29.37	28	25	74	20	11.5	29	4.0
19	9	29.39	26	24	78	20	9.8	28	3.3
22	8	29.38	25	24	79	19	9.8	29	2.8

USCOMM--ESSA--ASHEVILLE 350

OBSERVATIONS AT 3-HOUR INTERVALS

Day	Hour	Sky cover (tenths)	Ceiling (hund. of ft)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb °F	Wet bulb °F	Rel hum %	Dew pt °F	Wind dir	Wind speed (kts)
01	01	10	12	2		S	34	33	89	31	22	7
01	04	10	30	7		S	34	32	82	29	27	9
01	07	10	23	10		SW	31	29	75	24	26	10
01	10	10	9	1		S	30	28	84	25	31	10
01	13	10	12	1		S	28	27	82	23	34	17
01	16	10	12	0	8	SBS	28	27	82	23	36	12
01	19	10	12	0	12	S	29	27	72	21	34	13
01	22	10	11	2	8	S	26	24	78	20	33	10
02	01	10	21	6		S	24	22	68	15	34	9
02	04	10	23	8		S	19	18	84	15	29	5
02	07	1	UNL	12			05	05	96	04	25	7
02	10	10	120	10			16	16	88	13	21	8
02	13	10	80	15			24	22	71	16	18	12
02	16	10	46	15			27	24	69	18	18	10
02	19	10	20	7		S	30	27	66	20	21	7
02	22	10	25	7		S	36	34	79	30	23	11
03	01	10	55	12			37	34	76	30	25	9
03	04	10	23	10		S	37	34	76	30	26	11
03	07	10	15	6		S	32	30	82	27	29	12
03	10	7	23	15			29	26	66	19	30	12
03	13	4	UNL	15			27	24	66	17	31	16
03	16	10	21	7		SW	26	22	71	16	29	11
03	19	10	17	1	8	SW	23	22	85	19	27	8
03	22	10	38	10		SW	21	19	65	11	32	9
04	01	10	33	2		SW	19	18	84	15	28	7
04	04	10	25	2		SW	20	19	84	16	26	6
04	07	10	10	2		SW	22	21	85	18	27	7
04	10	10	15	1		SW	24	23	78	18	30	12
04	13	10	18	1		SWBS	26	24	78	20	29	17
04	16	10	10	2		SW	26	25	81	21	29	11
04	19	10	31	7		SW	26	24	72	18	31	14
04	22	10	16	10		SW	27	24	69	18	33	10
05	01	10	15	5		SW	26	24	78	20	31	10
05	04	10	21	7		SW	26	24	78	20	30	14
05	07	10	17	6		SW	25	23	78	19	31	10
05	10	10	19	6		SW	25	23	75	18	30	8
05	13	8	19	12			26	23	66	16	28	11
05	16	3	UNL	15			28	25	61	16	27	13
05	19	0	UNL	15			19	17	74	12	27	8
05	22	4	UNL	15			16	15	81	11	25	7
06	01	2	UNL	15			10	10	88	07	25	7
06	04	7	120	15			14	14	88	11	18	3
06	07	2	UNL	15			12	11	84	08	19	3
06	10	6	120	8			19	17	74	12	25	4
06	13	8	150	10			29	26	63	18	26	5
06	16	3	UNL	10			27	24	63	16	24	5
06	19	8	CIR	12			21	20	81	16	09	3
06	22	10	CIR	12			18	17	84	14	10	4
07	01	3	UNL	15			18	17	81	13	10	5
07	04	0	UNL	15			19	18	81	14	11	8
07	07	10	CIR	15			22	20	74	15	09	8
07	10	10	120	12			27	24	63	16	10	11
07	13	10	120	12			33	28	54	18	11	12
07	16	10	40	7		R	34	32	79	28	12	18
07	19	10	55	4		RS	35	33	82	30	13	9
07	22	10	25	12			38	36	79	32	13	7
08	01	10	70	15			41	37	70	32	16	13
08	04	10	30	15			42	38	71	33	16	11
08	07	10	33	15			42	39	73	34	16	7
08	10	10	23	12			39	36	79	33	09	5
08	13	10	19	12			40	37	76	33	22	2
08	16	10	4	1		LF	39	37	86	35	34	7
08	19	10	1	0	6	LF	37	36	89	34	26	3
08	22	10	1	0	4	LF	36	35	92	34	24	5
09	01	10	13	2		F	37	35	85	33	22	4
09	04	10	27	4		GF	36	33	89	33	24	5
09	07	10	31	7			36	34	82	31	24	5
09	10	10	28	6		H	37	34	73	29	24	2
09	13	8	UNL	7			40	35	60	27	30	3
09	16	7	UNL	7			37	33	67	27	14	3
09	19	0	UNL	8			32	30	79	26	10	5
09	22	0	UNL	10			31	29	82	26	09	4
10	01	0	UNL	7			28	27	85	24	10	3
10	04	0	UNL	7			26	25	88	23	12	3
10	07	4	UNL	7			27	26	88	24	09	3
10	10	10	120	5		H	32	31	85	28	12	7
10	13	10	120	5		H	34	32	85	30	10	9
10	16	10	90	5		H	36	34	79	30	09	9
10	19	10	6	2	8	RF	35	34	92	33	06	8
10	22	10	5	2	8	RF	36	35	89	33	06	12
11	01	10	6	3		RF	38	37	93	36	07	11
11	04	10	5	7		R	37	36	92	35	03	2
11	07	10	23	10		R	37	36	89	34	20	11
11	10	10	18	10			37	35	82	32	23	18
11	13	10	18	10			39	37	82	34	25	19
11	16	10	17	10		RS	40	37	79	34	25	19
11	19	10	23	10			40	37	73	32	26	23
11	22	2	UNL	15			40	36	70	31	27	17
12	01	6	30	12			40	36	68	30	25	13
12	04	5	UNL	12			37	34	73	29	25	10
12	07	10	40	8		L	37	34	73	29	27	11
12	10	10	40	2		SW	36	34	79	30	27	11
12	13	10	30	10		SW	37	33	67	27	25	11
12	16	5	UNL	10			35	31	67	25	25	11
12	19	10	30	7		SW	33	30	75	26	26	9
12	22	10	30	12			33	30	72	25	25	9
13	01	10	55	12			33	29	67	23	25	10
13	04	10	55	10			31	28	69	22	26	12
13	07	10	60	10			30	27	69	21	25	10
13	10	5	UNL	8			32	28	59	19	27	8
13	13	10	40	10			33	28	59	20	22	9
13	16	10	CIR	8			33	29	67	23	19	5
13	19	10	80	8			32	29	69	23	13	7
13	22	10	33	7		S	32	29	72	24	14	7
14	01	10	30	6		S	32	30	79	26	11	7
14	04	10	40	7			32	30	79	26	10	6
14	07	10	40	7			32	30	75	25	11	5
14	10	10	30	7		S	33	30	72	25	12	8
14	13	10	12	5		S	34	31	73	26	09	7
14	16	10	8	1	8	SF	34	32	79	28	06	6
14	19	10	17	6		SGW	32	31	82	28	09	5
14	22	10	7	6		SSG	34	32	82	29	01	10
15	01	10	7	4		S	34	32	82	29	02	9
15	04	10	9	4		S	31	29	78	25	35	10
15	07	10	7	4		S	28	27	85	24	32	8
15	10	10	9	4		S	30	28	75	23	34	10
15	13	10	10	4		S	30	28	75	23	31	10
15	16	10	19	1	8	S	29	27	75	22	30	11
15	19	10	35	6		S	27	25	78	21	27	6
15	22	10	27	7		S	27	25	78	21	28	8
16	01	10	70	10		S	27	24	66	17	31	8
16	04	10	21	6		S	25	23	69	16	29	11
16	07	10	20	2	8	S	24	21	74	16	28	9
16	10	10	20	1	8	S	24	22	71	16	30	10
16	13	5	UNL	8			25	22	66	15	30	16
16	16	7	25	6		SW	26	24	72	18	27	9
16	19	10	23	8		SW	26	24	72	18	28	7
16	22	10	23	6		SW	27	25	78	21	27	5
17	01	10	15	6		SW	27	25	78	21	32	7
17	04	10	20	10		SW	27	24	69	18	31	8
17	07	10	33	10		SW	26	24	78	20	28	6
17	10	9	30	3		S	29	27	75	22	29	7
17	13	8	30	7		S	33	29	61	21	30	12
17	16	7	50	10		S	31	27	64	20	32	7
17	19	10	19	8		SW	31	29	78	25	25	5
17	22	10	35	8			31	29	75	24	25	6
18	01	10	33	10			29	27	72	21	21	7
18	04	10	35	10			31	29	75	24	19	7
18	07	10	13	3		H	29	27	82	24	21	6
18	10	10	36	6		H	33	29	67	23	19	6
18	13	10	80	6		H	34	29	59	21	18	10
18	16	10	10	0	12	SH	31	30	85	27	14	6
18	19	10	12	1		SH	31	29	82	26	14	6
18	22	10	20	1		SH	30	29	85	26	15	5
19	01	10	13	7		S	32	30	82	27	21	7
19	04	10	7	1	8	S	33	32	85	29	29	10
19	07	10	9	7		S	31	30	85	27	31	13
19	10	10	8	1		S	32	31	85	28	27	9
19	13	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
19	16	10	8	0	8	SW	32	30	82	27	27	12
19	19	3	UNL	15			30	27	72	22	27	12
19	22	7	70	10			28	25	63	17	29	13
20	01	10	25	7		SW	28	25	63	17	27	11
20	04	8	18	8		SW	24	22	71	16	29	12
20	07	10	17	6		SW	24	22	71	13	29	16
20	10	10	16	5		SW	24	22	71	16	30	13
20	13	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
20	16	9	UNL	8			25	22	60	13	25	8
20	19	10	38	8		SW	27	25	72	19	22	8
20	22	10	33	10			27	24	63	16	26	8
21	01	10	28	10			28	25	69	19	23	6
21	04	10	21	10			29	26	69	20	24	7
21	07	10	21	10		SW	29	26	66	19	21	7
21	10	10	27	8			28	25	61	16	18	13
21	13	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
21	16	10	75	8			33	27	50	16	14	5
21	19	10	19	8			34	29	52	18	19	10
21	22	10	19	1	8	S	30	28	82	25	20	8
22	01	10	8	1	8	S	31	29	82	26	19	8
22	04	10	8	1	8	S	31	30	85	27	23	6
22	07	10	8	1	8	S	31	30	85	27	27	5
22	10	10	35	7			33	29	61	21	32	11
22	13	9	19	15			25	23	75	18	32	16
22	16	10	17	12			23	22	78	17	31	15
22	19	10	33	10			19	18	77	13	31	12
22	22	10	23	4		SW	17	16	74	10	34	8
23	01	10	28	6		SW	12	11	84	08	35	9
23	04	10	16	6		SW	09	09	84	05	31	6
23	07	10	14	1	8	SW	09	09	87	06	35	7
23	10	10	15	7			10	09	80	05	07	5
23	13	10	120	10			10	09	80	05	12	6
23	16	10	15	1	8	S	07	07	83	03	10	6
23	19	10	45	7		S	07	07	87	04	09	6
23	22	10	29	7		S	09	09	87	06	11	9
24	01	10	28	2		S	08	08	91	06	12	4
24	04	10	19	4		S	10	10	88	07	09	4
24	07	10	19	2		S	09	09	91	07	20	2
24	10	10	20	1	8	S	11	11	92	09	24	6
24	13	10	20	1		S	16	15	84	12	35	12
24	16	9	20	5		S	13	12	80	08	33	8
24	19	10	CIR	7		SW	06	06	96	05	29	6
24	22	8	CIR	7		IC	03	03	91	01	23	3
25	01	4	UNL	10		IC	-02	-02	95	-03	23	3
25	04	3	UNL	10			-04	-04	91	-06	16	3
25	07	10	CIR	10			00	00	75	-06	24	2
25	10	10	100	7			03	03	79	-02	25	3
25	13	10	100	7			12	11	84	08	09	7
25	16	10	70	2		S	17	16	74	10	12	12
25	19	10	45	4		S	16	16	92	14	10	11
25	22	10	33	6		S	18	18	88	15	13	12
26	01	10	33	7		S	19	19	88	16	12	8
26	04	10	36	4		S	18	18	92	16	06	8
26	07	10	15	1	8	S	17	17	92	15	07	7
26	10	10	8	1		S	23	22	88	20	07	13
26	13	10	9	0	8	SBS	24	23	88	21	36	17
26	16	10	9	0	8	SBS	22	21	85	18	36	17
26	19	10	8	0	12	SBS	21	21	92	19	35	13
26	22	10	7	0	12	SBS	21	20	88	18	34	11
27	01	10	20	1	8	SBS	20	19	88	17	30	9
27	04	10	14	6		S	20	19	88	17	31	10
27	07	10	9	8		S	19	19	88	16	30	16
27	10	10	9	7			17	17	92	15	29	25
27	13	10	15	7			22	21	89	18	32	25
27	16	7	21	10			21	20	78	15	31	22
27	19	10	25	10			22	21	81	17	30	21
27	22	9	28	12			22	21	78	16	32	19
28	01	1	UNL	15			22	20	74	15	30	20
28	04	0	UNL	15			20	19	81	15	30	17
28	07	0	UNL	15			20	18	74	13	30	16
28	10	0	UNL	15			23	20	60	11	30	15
28	13	0	UNL	15			24	21	60	12	30	20
28	16	0	UNL	15			24	21	58	11	28	17
28	19	[illegible]	[illegible]	[illegible]			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
28	22	0	UNL	15			14	13	74	07	24	7
29	01	0	UNL	10			07	07	87	04	24	7
29	04	0	UNL	10			08	08	87	05	26	6
29	07	0	UNL	10			05	05	91	03	23	4
29	10	0	UNL	10			11	10	80	06	25	5
29	13	0	UNL	10			23	20	65	13	23	6
29	16	10	UNL	8			24	21	66	14	14	3
29	19	[illegible]	[illegible]	[illegible]			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
29	22	10	70	10			24	22	71	16	09	6
30	01	10	70	10			24	23	78	18	07	5
30	04	10	70	10			26	24	72	18	05	6
30	07	10	55	10			26	24	72	18	07	7
30	10	10	25	6		H	27	24	69	18	09	7
30	13	10	70	8			30	27	66	20	05	7
30	16	10	13	10			28	27	85	24	06	7
30	19	[illegible]	[illegible]	[illegible]			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
30	22	10	11	10			27	26	85	23	04	8
31	01	10	100	10			25	23	78	19	08	8
31	04	10	5	1		S	23	23	92	21	06	8
31	07	10	5	1		S	23	23	92	21	05	7
31	10	10	9	1	8	S	25	25	92	23	04	10
31	13	10	9	2		SBS	23	22	85	19	03	17
31	16	10	21	12			23	22	78	17	36	10
31	19	3	UNL	15			10	09	80	05	00	0
31	22	0	UNL	15			06	06	87	03	24	5

NOTES

CEILING COLUMN

UNL indicates an unlimited ceiling.
CIR indicates a cirriform cloud ceiling of unknown height

WEATHER COLUMN

- • Tornado
- T Thunderstorm
- Q Squall
- R Rain
- RW Rain showers
- ZR Freezing rain
- L Drizzle
- ZL Freezing drizzle
- S Snow
- SP Snow pellets
- IC Ice crystals
- SW Snow showers
- SG Snow grains
- E Sleet
- A Hail
- AP Small hail
- F Fog
- IF Ice fog
- GF Ground fog
- BD Blowing dust
- BN Blowing sand
- BS Blowing snow
- BY Blowing spray
- K Smoke
- H Haze
- D Dust

WIND COLUMNS

Directions are those from which the wind blows, indicated in tens of degrees from true North, i.e., 09 for East, 18 for South, 27 for West. Entry of 00 in the direction column indicates calm.

Speed is expressed in knots; multiply by 1.15 to convert to miles per hour.

ADDITIONAL DATA

Other observational data contained in records on file can be furnished at cost via microfilm or microfiche copies of the original records. Inquiries as to availability and costs should be addressed to Director, National Weather Records Center, Federal Building. Asheville, N. C. 28801

STATION: ROCHESTER N Y YEAR & MONTH: 69 12

LOCAL CLIMATOLOGICAL DATA

U.S. DEPARTMENT OF COMMERCE
MAURICE H. STANS, Secretary
ENVIRONMENTAL SCIENCE SERVICES ADMINISTRATION
ENVIRONMENTAL DATA SERVICE

ROCHESTER, NEW YORK
ROCHESTER-MONROE COUNTY AP
JANUARY 1970

Latitude 43° 07' N Longitude 77° 40' W Elevation (ground) 547 ft Standard time used EASTERN

Date	Temperature (°F) Maximum	Minimum	Average	Departure from normal	Average dew point	Degree days (Base 65°) Heating	Cooling	Weather types shown by code 1-9 on dates of occurrence (1 Fog, 2 Heavy Fog, 3 Thunderstorm, 4 Sleet, 5 Hail, 6 Glaze, 7 Duststorm, 8 Smoke, Haze, 9 Blowing Snow)	Snow, Sleet, or Ice on ground at 07AM (In.)	Precipitation Water equivalent (In.)	Snow, sleet (In.)	Avg station pressure (In.) Elev 555 feet m.s.l.	Wind Resultant direction	Resultant speed (m.p.h.)	Average speed (m.p.h.)	Fastest mile Speed (m.p.h.)	Direction	Sunshine Hours and tenths	Percent of possible	Sky cover (Tenths) Sunrise to sunset	Midnight to midnight	Date
1	2	3	4	5	6	7A	7B	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	20	-8*	6	-20	-1	59	0		13	0	0	29.51	22	3.4	3.7	6	S	2.6	29	8	5	1
2	21	0	11	-15	1	54	0		12	0	0	29.46	21	3.7	4.0	7	S	9.1	100	0	3	2
3	30	17	24	-2	16	41	0	8	11	.06	1.1	29.34	06	3.1	5.0	10	N	0.0	0	10	10	3
4	25	14	20	-6	12	45	0	8	12	.01	.3	29.48	22	6.8	7.2	15	SW	3.9	43	7	9	4
5	30	8	19	-7	14	46	0	8	11	T	.4	29.57	24	7.8	8.2	17	SW	4.8	53	4	6	5
6	24	7	16	-10	7	49	0		10	T	T	29.52	24	5.5	6.0	11	W	8.1	88	2	4	6
7	24	6	15	-11	8	50	0	8	10	T	.3	29.32	24	3.7	4.5	13	W	1.0	11	10	8	7
8	12	6	9	-17	-8	56	0		10	T	T	29.25	23	12.0	12.1	25	SW	6.6	72	10	10	8
9	18	5	12	-14	-3	53	0		10	T	T	29.32	24	17.4	17.5	26	SW	8.5	92	3	6	9
10	22	17	20	-6	11	45	0	9	12	.05	2.5	29.43	29	15.4	16.1	25	NW	7.2	78	6	8	10
11	25	15	20	-6	11	45	0		10	T	.3	29.42	25	9.4	9.9	23	SW	6.5	70	4	7	11
12	27	17	22	-4	16	43	0	8	11	.15	2.8	29.29	20	2.0	5.8	16	W	4.6	49	10	10	12
13	28	17	23	-3	18	42	0	89	15	.41	12.2	29.40	27	13.9	14.2	23	W	4.6	49	10	10	13
14	17	4	11	-15	3	54	0	89	21	T	T	29.60	30	9.3	9.6	23	NW	6.2	67	6	8	14
15	15	-4	6	-20	-5	59	0	8	18	T	T	29.76	21	2.3	5.6	11	E	6.7	71	4	6	15
16	46	7	27	1	16	38	0	1 8	17	T	0	29.49	21	5.9	7.8	22	W	5.0	53	7	8	16
17	39	27	33	7	28	32	0	1 8	14	.29	3.7	29.34	33	5.4	7.6	12	N	0.0	0	10	10	17
18	27	-2	13	-13	11	52	0	8	16	.13	3.1	29.35	30	8.9	9.6	18	W	5.4	57	8	7	18
19	16	-3	7	-19	1	58	0	8	18	T	.3	29.47	23	6.6	7.5	13	SW	0.7	7	10	7	19
20	17	-4	7	-18	-3	58	0		15	T	.3	29.34	22	3.2	4.6	12	W	5.2	55	9	8	20
21	13	0	7	-18	-4	58	0	9	18	.22	5.3	29.51	31	10.1	12.8	23	W	5.9	62	8	8	21
22	14	-2	6	-19	-2	59	0	8	18	T	.5	29.56	24	6.0	7.2	19	W	7.5	78	6	7	22
23	21	7	14	-11	10	51	0	8	17	.12	3.0	29.28	24	8.7	10.2	15	W	0.1	1	10	10	23
24	22	-2	10	-15	8	55	0	8	18	T	.1	29.45	21	3.2	6.3	12	N	5.6	58	6	8	24
25	34	22	28	3	24	37	0	1 8	16	.15	.4	29.09	14	5.3	7.8	11	E	0.0	0	10	10	25
26	34	23	29	4	25	36	0	1 8	14	.11	.4	29.16	32	6.0	7.5	20	N	0.0	0	10	10	26
27	35	24	30	5	26	35	0	1 8	13	.04	.7	29.40	18	4.7	5.9	10	SE	1.1	11	10	10	27
28	46	32	39	14	29	26	0	1	13	.06	T	29.31	17	9.1	10.6	32	SW	1.0	10	10	10	28
29	47*	27	37	12	34	28	0	1	10	T	T	29.01	24	10.7	12.1	28	SW	0.0	0	10	10	29
30	27	10	19	-6	12	46	0		8	T	.2	29.43	29	11.6	12.9	23	W	6.5	66	4	5	30
31	40	13	27	2	18	38	0		7	0	0	29.59	23	11.5	12.1	30	SW	5.0	51	7	8	31
	Sum 816	Sum 300				Total 1448	Total 0	Number of days		Total 1.80	Total 37.9	For the month: 29.39	25	5.6	8.8	32	SW	Total 129.4	% for month	Sum 229	Sum 246	
	Avg 26.3	Avg 9.7	Avg 18.0	Dep -7.2	Avg 11	Dep 214	Dep	Precipitation ≥ .01 inch 13		Dep -0.60						Date 28		Possible 291.9	44	Avg 7.4	Avg 7.9	

Number of days				Season to date		
Maximum Temp. ≤ 32°	Maximum Temp. ≥ 90° ‡	Minimum Temp. ≤ 32°	Minimum Temp. ≤ 0°	Total 4007	Total 0	Snow, sleet ≥ 1.0 inch 8
23	0	31	9	Dep. 320	Dep.	Thunderstorms 0
						Heavy fog X 0

Greatest in 24 hours and dates: Precipitation	Date	Snow, Sleet	Date	Greatest depth on ground of snow, sleet or ice and date	Date
.41	13	12.2	13	21	14+

HOURLY PRECIPITATION (Water equivalent in inches)

Date	A.M. 1	2	3	4	5	6	7	8	9	10	11	12	P.M. 1	2	3	4	5	6	7	8	9	10	11	12	Date
1																									1
2																									2
3	T	T	T	.01	T	T	T	T	T	T	T	T	.01	.02	.01	.01	T	T	T	T	T	T	T	T	3
4			T	T		T	.01	T	T	T	T								T	T	T				4
5		T	T	T	T	T									T	T	T								5
6										T	T														6
7												T	T	T	T	T	T	T						T	7
8	T	T																							8
9																							T	T	9
10	T	.01	.01	.02	.01	T	T	T	T				T	T	T	T									10
11					T	T	T	T	T	T	T														11
12		T	T	.01	.01	.01	.02	.02	.01	.01	.01	T	T	T	.02	.01	.01	T	T	.01	T	T	T	T	12
13	T	.01	.02	.01	.01	.01	.02	T	.01	.01	.01	.01	.01	.01	.01	.01	.04	.02	.04	.03	.04	.05	.02	.01	13
14	T	T	T	T	T	T	T	T				T	T	T	T	T	T	T	T	T	T	T	T	T	14
15	T	T								T															15
16																						T	T	T	16
17	T	T	T	T	T	T	T	T	T	T	.05	.02	.01	T	.04	.02	.02	.02	T	.02	.01	.03	.03	.02	17
18	T	.01	.01	T	T	T	T	.01	.02	.02	.02	.02	.02	T										T	18
19	T	T	T	T	T						T	T	T	T	T	T	T	T							19
20				T	T	T	T	T											T	T	T			T	20
21	.02	.02	.03	.03	.02	.02	.01	.01	.01	.01	T	T	T	T	T		T	.01	.01	T	T	T	.01	.01	21
22	T	T	T	T	T	T	T	T	T	T	T	T	T	T											22
23						T	T	T	.01	.01	.03	.02	.01	T	T	T	T	.01	.01	T	T	T	.01	.01	23
24	T	T	T	T			T	T	T										T	T	T	T	T		24
25								T	.02	.02	T	T	T								T	.02	.04	.05	25
26	.03	.03	.02	.01	T	T	T	T	T	.01	.01	T	T		T	T	T	T	T	T					26
27																.01	.01	.01	.01	T	T	T	T	T	27
28												T				.06	T				T		T	T	28
29													T	T	T	T	T		T	T	T	T	T	T	29
30	T	T			T	T	T	T	T	T	T	T					T								30
31																									31

- * Extreme temperatures for the month. May be the last of more than one occurrence.
- – Below zero temperature or negative departure from normal.
- ‡ ≥ 70° at Alaskan stations.
- + Also on an earlier date, or dates.
- X Heavy fog restricts visibility to ¼ mile or less.
- T In the Hourly Precipitation table and in columns 9, 10, and 11 indicates an amount too small to measure.

The season for degree days begins with July for heating and with January for cooling.
Data in columns 6, 12, 13, 14, and 15 are based on 8 observations per day at 3-hour intervals.
Wind directions are those from which the wind blows. Resultant wind is the vector sum of wind directions and speeds divided by the number of observations. Figures for directions are tens of degrees from true North; i.e., 09 = East, 18 = South, 27 = West, 36 = North, and 00 = Calm. When directions are in tens of degrees in Col. 17, entries in Col 16 are fastest observed 1-minute speeds. If the / appears in Col 17, speeds are gusts.

Any errors detected will be corrected and changes in summary data will be annotated in the annual summary.

Subscription Price: Local Climatological Data $1.00 per year including annual Summary if published. Single copy: 10 cents for monthly Summary; 15 cents for annual Summary. Checks or money orders should be made payable and remittances and correspondence should be sent to the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.

I certify that this is an official publication of the Environmental Science Services Administration, and is compiled from records on file at the National Weather Records Center, Asheville, North Carolina 28801.

William H. Haggard

Director, National Weather Records Center

SUMMARY BY HOURS

Hour (Local time)	AVERAGES: Sky cover (In tenths)	Station pressure (In.)	Dry bulb (°F)	Wet bulb (°F)	Rel. hum. (%)	Dew point (°F)	Wind speed (m.p.h.)	Resultant wind: Direction	Speed (m.p.h.)
01	8	29.38	17	15	73	9	8.2	24	5.4
04	9	29.40	17	15	75	10	8.3	26	5.8
07	8	29.41	16	15	75	9	7.7	26	4.9
10	6	29.43	18	16	72	10	8.9	25	5.0
13	7	29.38	22	20	67	13	10.8	25	7.6
16	8	29.38	23	20	68	13	9.5	25	6.0
19	8	29.39	20	18	70	11	7.9	25	4.5
22	8	29.38	19	17	71	10	8.8	24	6.1

USCOMM—ESSA—ASHEVILLE 350

OBSERVATIONS AT 3-HOUR INTERVALS

Columns: HOUR; SKY COVER (Tenths); CEILING (Hnds. of ft.); VISIBILITY: WHOLE MILES, 16ths MILE; WEATHER; DRY BULB °F; WET BULB °F; REL HUM %; DEW PT °F; WIND: DIR, SPEED (Knots)

DAY 01

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel hum	Dew pt	Wind dir	Wind speed
01	0	UNL	12			-02	-02	79	-07	20	4
04	0	UNL	12			-05	-05	83	-09	23	3
07	0	UNL	12			-06	-06	78	-11	20	3
10	7	CIR	10			01	01	83	-03	00	0
13	10	CIR	10			18	17	81	13	19	6
16	8	UNL	10			18	16	68	09	26	4
19	10	65	10			11	10	73	04	23	4
22	3	UNL	15			05	04	72	-02	21	2

DAY 02

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel hum	Dew pt	Wind dir	Wind speed
01	2	UNL	15			02	01	76	-04	23	3
04	0	UNL	15			02	01	69	-06	23	3
07	0	UNL	10			00	00	68	-08	23	5
10	0	UNL	15			08	06	60	-03	25	4
13	0	UNL	15			17	16	74	10	18	6
16	0	UNL	15			21	18	55	07	20	4
19	7	CIR	12			12	11	73	05	00	0
22	10	38	12			14	12	70	06	20	3

DAY 03

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel hum	Dew pt	Wind dir	Wind speed
01	10	46	8		S	17	15	71	09	16	3
04	10	28	4		S	20	18	74	13	11	3
07	10	35	4		S	21	20	78	15	08	5
10	10	25	2		S	23	21	74	16	06	5
13	10	12	2	8	SH	27	25	72	19	30	5
16	10	15	1		S	28	26	75	21	04	10
19	10	16	5		S	27	24	69	18	08	4
22	10	25	7		S	24	23	78	18	00	0

DAY 04

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel hum	Dew pt	Wind dir	Wind speed
01	10	9	8			24	22	75	17	25	2
04	10	15	5		H	19	17	74	12	20	5
07	10	23	4		SH	20	18	74	13	22	4
10	9	55	7		S	20	18	68	11	22	8
13	4	UNL	7			22	19	62	11	24	11
16	7	UNL	7			21	19	65	11	24	9
19	10	28	6		SW	19	17	74	12	21	6
22	10	38	8			14	12	67	05	19	5

DAY 05

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel hum	Dew pt	Wind dir	Wind speed
01	10	46	10			20	18	65	10	20	6
04	10	15	4		SW	23	21	71	15	22	7
07	10	23	10			25	23	72	17	23	5
10	0	UNL	7			21	18	62	10	24	9
13	3	UNL	10			29	25	56	15	25	10
16	10	23	4		SW	30	27	72	22	24	8
19	3	UNL	10			22	20	71	14	27	6
22	3	UNL	12			16	14	71	08	23	6

DAY 06

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel hum	Dew pt	Wind dir	Wind speed
01	0	UNL	10			10	09	80	05	26	5
04	4	UNL	10			09	09	86	05	23	6
07	2	UNL	10			09	08	76	03	23	5
10	2	UNL	8		SW	14	13	77	08	24	6
13	2	UNL	10			23	20	57	10	25	8
16	1	UNL	10			20	17	60	08	27	7
19	8	UNL	10			17	15	68	08	18	6
22	10	CIR	10			12	11	77	06	24	3

DAY 07

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel hum	Dew pt	Wind dir	Wind speed
01	10	25	8			15	14	74	08	20	4
04	10	65	10			15	14	77	09	18	4
07	4	UNL	10			09	09	84	05	22	2
10	10	90	3		H	15	14	77	09	20	1
13	10	70	3		SWH	22	20	65	12	00	0
16	10	35	3		SH	23	21	71	15	17	1
19	10	46	8			20	17	52	05	27	11
22	7	70	15			14	12	61	03	25	5

DAY 08

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel hum	Dew pt	Wind dir	Wind speed
01	10	23	7		SW	08	07	73	01	23	7
04	10	100	10			09	06	65	-08	23	10
07	10	45	10			08	06	45	-09	22	8
10	10	CIR	10			06	04	45	-11	22	9
13	10	CIR	10			10	07	46	-07	23	14
16	10	CIR	10			09	06	45	-08	23	14
19	10	CIR	15			07	05	43	-11	23	14
22	10	33	10			07	05	47	-09	23	8

DAY 09

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel hum	Dew pt	Wind dir	Wind speed
01	10	55	12			08	06	52	-06	24	17
04	10	55	10			08	06	55	-05	24	18
07	2	UNL	15			06	04	50	-09	25	17
10	2	UNL	15			08	06	48	-08	23	15
13	2	UNL	15			11	09	53	-03	24	13
16	6	CIR	12			12	10	58	00	25	18
19	10	55	10			13	11	64	03	26	12
22	10	25	10			14	12	64	04	25	12

DAY 10

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel hum	Dew pt	Wind dir	Wind speed
01	10	16	1		SW	20	18	74	13	26	17
04	10	19	4		SWBS	22	20	71	14	29	16
07	10	19	8		SW	21	19	68	12	30	15
10	2	UNL	5		BS	18	16	71	10	31	17
13	7	20	7		SW	19	17	65	09	29	15
16	5	UNL	7			21	19	65	11	29	13
19	7	CIR	10			19	17	65	09	27	11
22	10	25	10			20	18	65	10	26	8

DAY 11

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel hum	Dew pt	Wind dir	Wind speed
01	10	28	15			19	17	65	09	27	6
04	10	28	15			22	20	71	14	29	10
07	10	28	15		SW	23	21	68	14	25	11
10	4	UNL	3		SW	23	21	71	15	25	13
13	0	UNL	8			24	21	60	12	26	13
16	4	UNL	10			23	20	57	10	25	7
19	8	CIR	10			16	14	67	07	25	5
22	10	22	10			18	16	65	08	17	4

DAY 12

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel hum	Dew pt	Wind dir	Wind speed
01	10	55	15			19	17	65	09	21	2
04	10	10	1	8	S	23	21	71	15	12	6
07	10	21	1	8	S	22	21	78	16	10	5
10	10	25	1	8	S	24	22	71	16	12	5
13	10	CIR	2		S	26	24	69	17	24	5
16	10	20	1	8	S	27	25	77	19	30	6
19	10	30	1	8	SH	25	23	78	19	26	6
22	10	15	4		SH	23	22	81	18	20	5

DAY 13

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel hum	Dew pt	Wind dir	Wind speed
01	10	35	5		SH	28	26	72	20	27	12
04	10	15	1		S	28	25	69	19	27	17
07	10	23	1		S	26	24	75	19	26	11
10	10	15	1		S	27	25	75	20	27	10
13	10	15	1		SBS	27	25	72	19	27	18
16	10	20	1	8	SBS	26	24	72	18	27	13
19	10	6	0	12	S	23	22	78	17	28	10
22	10	2	0	8	S	19	18	81	14	31	8

DAY 14

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel hum	Dew pt	Wind dir	Wind speed
01	7	25	6		SW	14	12	70	06	32	7
04	10	23	4		SW	08	07	80	03	29	6
07	10	25	5		SW	12	11	73	05	32	7
10	0	UNL	7			09	08	73	02	28	6
13	5	UNL	4		SWBS	13	11	64	03	28	13
16	10	20	4		SW	12	10	67	03	29	10
19	7	30	15			11	09	66	01	30	7
22	10	21	10		SW	13	11	66	03	30	11

DAY 15

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel hum	Dew pt	Wind dir	Wind speed
01	5	UNL	15		SW	00	00	54	-13	24	6
04	8	17	15			01	00	59	-10	26	5
07	10	17	15			00	00	59	-11	23	5
10	8	15	4		H	04	03	69	-04	25	6
13	1	UNL	7			12	10	58	00	24	6
16	1	UNL	7			14	11	51	-01	11	6
19	6	UNL	10			11	09	58	-01	08	5
22	10	40	10			14	12	59	02	12	6

DAY 16

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel hum	Dew pt	Wind dir	Wind speed
01	3	UNL	12			13	11	64	03	22	5
04	7	100	12			10	09	73	03	15	4
07	5	UNL	12			09	08	67	00	00	0
10	1	UNL	10			25	22	58	12	18	8
13	10	CIR	7			39	32	46	20	20	7
16	10	75	6		H	44	37	51	27	21	7
19	10	46	10			45	39	55	30	22	10
22	10	19	5		RWH	42	38	68	32	26	13

DAY 17

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel hum	Dew pt	Wind dir	Wind speed
01	10	10	4		LF	39	36	79	33	25	7
04	10	15	4		SF	37	34	76	30	29	8
07	10	23	8		S	36	33	78	28	29	7
10	10	12	1	4	SH	35	32	76	28	36	4
13	10	9	1	8	SH	35	32	76	28	30	5
16	10	7	1		SH	31	30	85	27	36	6
19	10	6	1		SH	30	29	85	26	02	8
22	10	6	1		SH	28	27	85	24	36	10

DAY 18

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel hum	Dew pt	Wind dir	Wind speed
01	10	15	2	8	S	27	26	85	23	32	6
04	10	7	7		S	26	25	85	22	32	9
07	10	9	8		S	23	22	81	18	33	8
10	10	10	1		SH	20	19	84	16	33	8
13	8	25	7		S	17	15	68	08	29	14
16	4	UNL	10			15	13	59	03	29	10
19	2	UNL	15			09	08	70	01	30	7
22	2	UNL	15			03	02	69	-05	25	5

DAY 19

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel hum	Dew pt	Wind dir	Wind speed
01	10	15	1	8	SW	04	03	69	-04	23	5
04	5	UNL	7		SW	01	00	72	-06	25	5
07	6	CIR	8			01	00	72	-06	27	6
10	10	120	10			07	06	73	00	22	5
13	10	120	1	8	S	13	12	77	07	20	5
16	10	75	1	8	SH	15	14	77	09	17	7
19	8	70	15			12	11	70	04	23	5
22	0	UNL	15			09	08	67	01	23	12

DAY 20

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel hum	Dew pt	Wind dir	Wind speed
01	0	UNL	15			00	00	56	-12	24	4
04	10	25	10		SW	05	04	69	-03	22	4
07	4	UNL	10		SW	00	00	59	-11	20	3
10	10	CIR	10			03	02	63	-07	20	[illegible]
13	10	CIR	10			15	12	51	00	24	4
16	10	120	10			17	14	47	00	21	2
19	10	21	7		S	13	11	67	04	08	5
22	10	33	8			11	09	67	02	24	5

DAY 21

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel hum	Dew pt	Wind dir	Wind speed
01	10	8	1	8	S	13	12	70	05	36	12
04	10	25	1	4	SBS	09	08	73	02	34	13
07	10	25	1		S	06	05	80	01	33	7
10	10	15	0	12	SBS	05	05	63	-04	33	10
13	8	5	2		SWBS	05	04	60	-06	30	15
16	7	UNL	5		BS	04	03	60	-07	29	10
19	9	21	7			00	00	56	-12	25	9
22	6	15	1		SW	00	-01	56	-12	25	13

DAY 22

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel hum	Dew pt	Wind dir	Wind speed
01	1	UNL	10		SW	-02	-02	75	-08	25	6
04	10	46	5		SW	03	02	76	-03	25	5
07	10	38	2		SW	04	03	79	-01	27	5
10	0	UNL	5		H	08	07	73	01	24	5
13	7	25	4		SWH	12	11	73	05	26	11
16	5	UNL	10			11	10	73	04	24	9
19	7	CIR	8			05	04	63	-05	15	5
22	6	80	10			02	01	59	-09	18	4

DAY 23

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel hum	Dew pt	Wind dir	Wind speed
01	10	70	10			09	08	67	00	20	11
04	10	80	10			13	11	58	01	21	8
07	10	50	2		S	15	14	80	10	21	6
10	10	30	1	8	S	17	16	77	11	21	7
13	10	35	5		H	21	20	81	16	25	13
16	10	46	4		SH	21	20	81	16	26	10
19	10	33	7		S	20	19	81	15	29	7
22	10	33	7		S	17	16	74	10	28	9

DAY 24

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel hum	Dew pt	Wind dir	Wind speed
01	10	25	3		SW	14	13	80	09	35	5
04	10	28	10			11	10	84	07	35	5
07	10	23	6		SW	09	09	84	05	25	5
10	0	UNL	6		H	07	06	80	02	22	7
13	8	UNL	10			15	14	77	09	21	6
16	10	100	10			17	16	74	10	17	5
19	10	46	15			19	17	65	09	18	6
22	10	33	15		S	21	19	68	12	19	6

DAY 25

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel hum	Dew pt	Wind dir	Wind speed
01	10	19	10			23	21	74	16	20	10
04	10	19	8			25	24	81	20	22	5
07	10	19	8			28	26	78	22	20	6
10	10	14	2		S	30	29	89	27	13	6
13	10	33	4		H	31	29	82	26	11	9
16	10	28	7			32	30	79	26	11	6
19	10	19	10			33	30	72	25	09	6
22	10	19	2		RGF	33	32	92	31	11	6

DAY 26

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel hum	Dew pt	Wind dir	Wind speed
01	10	7	1		RF	34	34	100	34	36	3
04	10	8	1	8	SF	33	33	96	32	30	7
07	10	6	1	8	SF	25	24	88	22	34	9
10	10	10	1		SF	24	24	96	23	35	8
13	10	13	4		H	28	27	82	23	32	7
16	10	15	3		SH	28	27	85	24	32	7
19	10	25	7		S	26	25	85	22	27	5
22	10	25	10			24	23	85	20	23	6

DAY 27

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel hum	Dew pt	Wind dir	Wind speed
01	10	29	8			26	25	88	23	21	5
04	10	30	8			25	25	96	24	20	4
07	10	30	8			26	[illegible]	88	23	16	5
10	10	28	6		H	32	30	75	25	18	8
13	10	55	6		H	35	32	70	26	13	8
16	10	30	1		SH	34	32	85	30	18	5
19	10	15	1	8	SGF	31	30	92	29	13	1
22	10	20	3		SGF	32	32	96	31	26	5

DAY 28

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel hum	Dew pt	Wind dir	Wind speed
01	10	20	6		GF	32	32	96	31	23	5
04	10	25	8			32	31	89	29	25	5
07	10	25	8			32	31	89	29	16	4
10	10	UNL	8			37	32	59	24	13	10
13	10	70	10			38	34	67	28	15	12
16	10	46	3		RGF	37	35	79	31	17	10
19	10	40	10			40	36	68	30	17	11
22	10	70	10			44	38	58	30	19	17

DAY 29

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel hum	Dew pt	Wind dir	Wind speed
01	10	38	10			44	39	65	33	19	17
04	10	14	10			41	39	86	37	23	8
07	10	6	2	8	F	40	39	93	38	25	9
10	10	10	3		F	38	37	89	35	26	8
13	10	6	1		RF	37	36	92	35	25	9
16	10	9	1	8	RF	37	35	85	33	25	11
19	10	10	7		R	36	34	85	32	26	10
22	10	23	7		S	34	32	82	29	27	12

DAY 30

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel hum	Dew pt	Wind dir	Wind speed
01	10	16	10		S	26	24	78	20	30	15
04	10	15	12			23	21	74	16	29	13
07	10	17	3		SW	18	17	81	13	29	14
10	1	UNL	15			16	15	74	09	30	12
13	1	UNL	15			18	16	62	07	29	13
16	6	28	15			18	16	65	08	30	10
19	1	UNL	10			14	13	84	10	29	5
22	1	UNL	12			12	12	88	09	20	8

DAY 31

Hour	Sky cover	Ceiling	Vis. whole miles	Vis. 16ths mile	Weather	Dry bulb	Wet bulb	Rel hum	Dew pt	Wind dir	Wind speed
01	2	UNL	12			13	12	84	09	22	4
04	10	28	12			17	16	77	11	22	5
07	10	31	12			22	20	74	15	25	6
10	0	UNL	15			26	24	69	17	26	17
13	10	33	15			31	28	60	22	24	15
16	7	100	15			33	29	67	23	22	13
19	10	100	12			36	32	62	24	21	8
22	8	CIR	12			37	32	62	25	22	16

NOTES

CEILING COLUMN

UNL indicates an unlimited ceiling
CIR indicates a cirriform cloud ceiling of unknown height

WEATHER COLUMN

- T Tornado
- T Thunderstorm
- Q Squall
- R Rain
- RW Rain showers
- ZR Freezing rain
- L Drizzle
- ZL Freezing drizzle
- S Snow
- SP Snow pellets
- IC Ice crystals
- SW Snow showers
- SG Snow grains
- E Sleet
- A Hail
- AP Small hail
- F Fog
- IF Ice fog
- GF Ground fog
- BD Blowing dust
- BN Blowing sand
- BS Blowing snow
- BY Blowing spray
- K Smoke
- H Haze
- D Dust

WIND COLUMNS

Directions are those from which the wind blows, indicated in tens of degrees from true North, i. e., 09 for East, 18 for South, 27 for West. Entry of 00 in the direction column indicates calm.

Speed is expressed in knots; multiply by 1.15 to convert to miles per hour.

ADDITIONAL DATA
Other observational data contained in records on file can be furnished at cost via microfilm or microfiche copies of the original records. Inquiries as to availability and costs should be addressed to Director, National Weather Records Center, Federal Building, Asheville, N. C. 28801

STATION: ROCHESTER N Y   YEAR & MONTH: 70 01

LOCAL CLIMATOLOGICAL DATA

U.S. DEPARTMENT OF COMMERCE
MAURICE H. STANS, Secretary
ENVIRONMENTAL SCIENCE SERVICES ADMINISTRATION
ENVIRONMENTAL DATA SERVICE

ROCHESTER, NEW YORK
ROCHESTER-MONROE COUNTY AP
FEBRUARY 1970

Latitude 43° 07' N Longitude 77° 40' W Elevation (ground) 547 ft Standard time used EASTERN

Date	Temperature (°F) Maximum	Minimum	Average	Departure from normal	Average dew point	Degree days (Base 65°) Heating	Cooling	Weather types shown by code 1-9 on dates of occurrence (1 Heavy Fog, 2 Thunderstorm, 3 Sleet, 4 Hail, 5 Glaze, 6 Duststorm, 7 Smoke, Haze, 8 Blowing Snow)	Snow, Sleet, or Ice on ground at 07AM (In.)	Precipitation Water equivalent (In.)	Snow, sleet (In.)	Avg. station pressure (In.) Elev. 555 feet m.s.l.	Wind Resultant direction	Resultant speed m.p.h.	Average speed m.p.h.	Fastest mile Speed m.p.h.	Direction	Sunshine Hours and tenths	Percent of possible	Sky cover (Tenths) Sunrise to sunset	Midnight to midnight	Date
1	2	3	4	5	6	7A	7B	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	46	37	42	17	25	23	0		5	0	0	29.30	25	13.6	16.1	28	SW	8.8	88	4	7	1
2	47	34	41	16	31	24	0		3	.10	0	28.96	20	10.8	12.4	30	S	0.4	4	10	10	2
3	34	3	19	-6	8	46	0	9	2	.22	5.6	29.13	29	12.5	12.9	19	NW	0.0	0	10	10	3
4	13	-8*	3	-22	-9	62	0	8	7	.01	.2	29.54	26	3.6	7.9	14	SE	9.7	96	1	4	4
5	38	13	26	2	17	39	0		6	T	T	29.74	18	9.2	9.4	18	S	6.2	61	7	9	5
6	38	22	30	6	23	35	0		5	0	0	29.90	20	5.8	6.0	13	S	8.0	79	4	5	6
7	42	22	32	8	21	33	0		3	0	0	29.75	19	5.2	5.9	13	S	8.5	83	5	5	7
8	42	24	33	9	25	32	0	8	2	0	0	29.59	11	.7	4.8	10	NE	10.0	98	1	4	8
9	40	29	35	11	30	30	0	1 8	2	T	T	29.50	11	7.0	7.3	11	E	0.3	3	10	10	9
10	38	33	36	12	32	29	0	1	2	.83	3.0	29.14	06	4.5	6.5	13	N	0.0	0	10	10	10
11	33	18	26	1	23	39	0	1 9	4	.42	6.9	28.90	30	15.5	16.1	26	W	0.0	0	10	10	11
12	19	11	15	-10	10	50	0	89	10	.04	1.1	29.17	27	14.2	14.8	26	W	7.9	76	6	8	12
13	16	0	8	-17	1	57	0		11	.12	2.1	29.41	28	6.7	8.6	19	W	8.9	85	6	5	13
14	17	-5	6	-19	-4	59	0		10	0	0	29.71	20	3.2	5.5	14	SW	8.6	82	5	5	14
15	27	9	18	-7	16	47	0	1 8	10	.16	1.7	29.42	14	1.8	7.2	14	SE	0.5	5	10	10	15
16	25	6	16	-9	13	49	0	8	11	.04	1.0	29.66	25	3.0	5.8	11	W	7.4	70	7	8	16
17	36	4	20	[illegible]	11	45	0	8	10	0	0	29.44	20	1.3	3.2	9	S	8.6	81	8	7	17
18	51*	18	35	11	23	30	0	4	9	T	T	29.07	22	6.1	8.2	20	S	7.6	71	9	9	18
19	36	6	21	-4	19	44	0		6	.18	1.6	29.21	31	7.7	10.4	23	N	6.9	64	9	7	19
20	23	12	18	-7	12	47	0	89	7	.06	1.0	29.53	25	12.5	12.8	29	W	8.8	81	6	6	20
21	29	10	20	-5	14	45	0	8	7	.02	.3	29.63	26	13.0	13.1	21	W	2.5	23	10	7	21
22	43	29	36	11	28	29	0		7	T	T	29.26	28	18.8	19.7	30	W	9.1	83	7	7	22
23	32	16	24	-1	11	41	0		3	T	T	29.57	29	14.2	16.0	31	NW	9.2	84	7	6	23
24	39	24	32	6	25	33	0		3	0	0	29.25	25	12.2	12.5	22	W	8.7	79	5	6	24
25	37	5	21	-5	14	44	0	9	2	.08	2.6	29.20	30	16.0	17.3	27	NW	4.1	37	9	10	25
26	19	0	10	-16	-3	55	0		3	T	.1	29.40	20	3.6	7.8	13	SW	9.0	81	5	6	26
27	35	17	26	-1	16	39	0		3	T	.3	29.30	22	9.3	12.4	26	SW	0.8	7	10	9	27
28	27	16	22	-5	15	43	0		3	T	.2	29.73	26	11.7	12.1	21	W	5.4	48	8	7	28
	Sum 922	Sum 405				Total 1149	Total 0			Total 2.28	Total 27.7	For the month 29.41	26	6.3	10.4	31	NW	Total 165.9		Sum 199	Sum 207	
	Avg. 32.9	Avg. 14.5	Avg. 23.7	Dep. -1.2	Avg. 16	Dep. 26	Dep			Dep. -0.25						Date: 23		Possible 294.9	% month 56	Avg. 7.1	Avg. 7.4	

Number of days				Season to date	
Maximum Temp. ≥ 32°	≥ 90° ‡	Minimum Temp. ≤ 32°	≤ 0°	Total 5156	Total 0
11	0	25	4	Dep 346	Dep.

Number of days: Precipitation ≥ .01 inch 13; Snow, sleet ≥ 1.0 inch 10; Thunderstorms 0; Heavy fog X 0

Greatest in 24 hours and dates: Precipitation .83 (10); Snow, Sleet 6.9 (11)

Greatest depth on ground of snow, sleet or ice and date: 11 (16+)

HOURLY PRECIPITATION (Water equivalent in inches)

Date	A.M. Hour ending at 1	2	3	4	5	6	7	8	9	10	11	12	P.M. Hour ending at 1	2	3	4	5	6	7	8	9	10	11	12	Date
1																									1
2							T	T	.02	.02	.03	T	.01	T	T	T	T	T	.01	T	T	T	.01	T	2
3	T	T	T	T	T	T	T	T	T	.01	.04	.02	.03	.03	.04	.04	.01	T							3
4				T	T	T	.01	T	T	T	T											T	T	T	4
5	T																								5
6																									6
7																									7
8																									8
9													T	T	T	T	T							T	9
10	.01	.03	.06	.16	.10	.11	.08	.02	.01	.03	.01	.03	.03	.02	.02	.02	.02	.03	.02	.01	.01	T	T	T	10
11	T	.02	.03	.02	.01	.01	.01	.01	.01	.02	.01	.02	.01	.01	.01	.01	.01	.02	.04	.02	.04	.03	.02	.03	11
12	T	.01	.01	T	T	T		T	.01	T	T	T				T	T	T	T	T	T	T	T	.01	12
13	T	.05	.05	.01	.01	T	T	T			T	T	T	T											13
14																									14
15		T	T	T	T	T	T	T	T	T	.04	.06	.04	.01	.01	T	T	T	T	T				T	15
16	T	T	T	.01	.01	T	T	.01	.01	T	T	T	T	T											16
17																									17
18																							T	T	18
19	.02	.01	.01	.02	.02	.02	.02	.01	.02	.01	.01	T	.01	T	T	T									19
20	T	T	T	.01	.01	T	T	.01	T	T	.01	T	T	T	T	.01	.01	T	T	T	T	T	T		20
21									T	T	.01	.01	T	T	T	T	T	T	T	T	T	T			21
22																				T	T				22
23	T	T									T	T													23
24																									24
25				T	T	.01	T	T	.01	T	.01	T	T	.01	T	T	.01	.01	T	.01	.01	T	T	T	25
26	T	T	T	T																					26
27									T	T	T	T	T	T	T	T	T	T	T	T					27
28			T	T		T	T	T	T	T	T	T	T	T	T	T									28

* Extreme temperatures for the month. May be the last of more than one occurrence.
– Below zero temperature or negative departure from normal.
‡ ≥ 70° at Alaskan stations.
+ Also on an earlier date, or dates.
X Heavy fog restricts visibility to ¼ mile or less.
T In the Hourly Precipitation table and in columns 9, 10, and 11 indicates an amount too small to measure.
The season for degree days begins with July for heating and with January for cooling.
Data in columns 6, 12, 13, 14, and 15 are based on 8 observations per day at 3-hour intervals.
Wind directions are those from which the wind blows. Resultant wind is the vector sum of wind directions and speeds divided by the number of observations. Figures for directions are tens of degrees from true North; i.e., 09 = East, 18 = South, 27 = West, 36 = North, and 00 = Calm. When directions are in tens of degrees in Col. 17, entries in Col. 16 are fastest observed 1-minute speeds. If the / appears in Col. 17, speeds are gusts.

Any errors detected will be corrected and changes in summary data will be annotated in the annual summary.

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I certify that this is an official publication of the Environmental Science Services Administration, and is compiled from records on file at the National Weather Records Center, Asheville, North Carolina 28801.

William H. Haggard
Director, National Weather Records Center

SUMMARY BY HOURS

AVERAGES

Hour (Local time)	Sky cover (In tenths)	Station pressure (In.)	Dry bulb °F	Wet bulb °F	Rel. hum. %	Dew point °F	Wind speed (m.p.h.)	Resultant wind Direction	Speed (m.p.h.)
01	8	29.39	23	21	75	16	9.0	25	5.6
04	7	29.39	22	20	74	15	9.7	26	4.9
07	8	29.40	22	20	74	14	10.2	26	5.2
10	7	29.43	24	22	73	16	12.1	25	7.4
13	7	29.41	27	24	66	16	13.5	27	9.5
16	7	29.40	27	24	64	16	11.2	26	7.6
19	7	29.42	25	22	71	16	9.4	25	5.5
22	8	29.42	23	21	74	15	8.5	25	5.0

USCOMM – ESSA – ASHEVILLE 350

OBSERVATIONS AT 3-HOUR INTERVALS

DAY 01

Hour	Sky cover (tenths)	Ceiling (hnds. of ft.)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (°F)	Wet bulb (°F)	Rel. hum. (%)	Dew pt. (°F)	Wind dir	Wind speed (knots)
01	10	CIR	12			39	34	57	25	24	14
04	7	UNL	12			39	34	60	26	25	15
07	8	UNL	12			39	34	60	26	25	15
10	9	100	15			40	35	57	26	18	8
13	1	UNL	15			44	36	47	25	29	31
16	0	UNL	15			46	37	44	25	23	10
19	6	CIR	12			42	35	49	24	21	7
22	10	CIR	12			42	35	49	24	21	12

DAY 02

Hour	Sky cover (tenths)	Ceiling (hnds. of ft.)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (°F)	Wet bulb (°F)	Rel. hum. (%)	Dew pt. (°F)	Wind dir	Wind speed (knots)
01	10	CIR	12			43	36	47	24	20	11
04	10	CIR	12			43	35	42	21	19	7
07	10	CIR	12		R	46	36	37	21	18	15
10	10	70	12		R	43	40	76	36	18	17
13	10	70	12		R	44	40	74	36	19	14
16	10	33	15			45	42	77	38	21	6
19	10	10	7		R	40	39	89	37	25	6
22	10	9	7		R	36	35	89	33	27	10

DAY 03

Hour	Sky cover (tenths)	Ceiling (hnds. of ft.)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (°F)	Wet bulb (°F)	Rel. hum. (%)	Dew pt. (°F)	Wind dir	Wind speed (knots)
01	10	9	10		S	28	27	85	24	29	10
04	10	14	10		S	22	21	81	17	30	11
07	10	15	10		S	18	17	77	12	31	12
10	10	6	0	8	S	13	12	84	09	30	11
13	10	4	0	12	S	10	10	88	07	27	13
16	10	6	1		S	08	08	87	05	27	12
19	10	80	12			07	06	66	-02	28	12
22	10	100	15			04	02	94	-09	29	9

DAY 04

Hour	Sky cover (tenths)	Ceiling (hnds. of ft.)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (°F)	Wet bulb (°F)	Rel. hum. (%)	Dew pt. (°F)	Wind dir	Wind speed (knots)
01	0	UNL	15			01	00	62	-09	31	8
04	6	25	8		SW	-05	-05	64	-14	26	4
07	10	16	4		SW	00	00	68	-08	31	10
10	3	UNL	5		SW	01	00	65	-08	27	8
13	0	UNL	15			04	02	52	-10	25	8
16	0	UNL	15			07	05	45	-10	19	5
19	0	UNL	15			06	04	50	-09	13	6
22	10	46	12		S	07	05	52	-07	13	6

DAY 05

Hour	Sky cover (tenths)	Ceiling (hnds. of ft.)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (°F)	Wet bulb (°F)	Rel. hum. (%)	Dew pt. (°F)	Wind dir	Wind speed (knots)
01	10	55	10			15	14	74	08	19	5
04	10	46	10			20	18	65	10	17	7
07	10	35	10			23	20	63	12	16	6
10	7	100	12			26	24	69	17	19	12
13	7	CIR	15			34	29	59	21	18	11
16	3	UNL	15			37	32	57	23	18	10
19	10	46	12			34	30	64	23	18	8
22	10	46	12			33	29	61	21	18	6

DAY 06

Hour	Sky cover (tenths)	Ceiling (hnds. of ft.)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (°F)	Wet bulb (°F)	Rel. hum. (%)	Dew pt. (°F)	Wind dir	Wind speed (knots)
01	10	46	15			33	29	64	22	18	7
04	10	46	15			33	30	70	24	18	6
07	10	46	15			33	30	70	24	21	5
10	7	CIR	15			33	30	70	24	21	6
13	2	UNL	15			37	32	59	24	22	7
16	2	UNL	15			37	32	57	23	19	6
19	0	UNL	10			33	29	67	23	19	3
22	0	UNL	10			26	24	78	20	22	2

DAY 07

Hour	Sky cover (tenths)	Ceiling (hnds. of ft.)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (°F)	Wet bulb (°F)	Rel. hum. (%)	Dew pt. (°F)	Wind dir	Wind speed (knots)
01	0	UNL	15			22	21	88	19	18	3
04	0	UNL	15			23	22	81	18	20	7
07	0	UNL	15			23	22	81	18	20	5
10	0	UNL	8			30	27	69	21	20	8
13	9	CIR	8			38	32	53	22	18	9
16	10	UNL	12			41	34	47	22	23	6
19	10	CIR	8			35	30	59	22	04	1
22	10	CIR	8			31	29	75	24	12	2

DAY 08

Hour	Sky cover (tenths)	Ceiling (hnds. of ft.)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (°F)	Wet bulb (°F)	Rel. hum. (%)	Dew pt. (°F)	Wind dir	Wind speed (knots)
01	6	UNL	15			26	25	85	22	21	3
04	8	CIR	15			25	24	85	21	23	4
07	8	CIR	10			24	23	85	20	24	2
10	1	UNL	8			33	30	72	25	20	6
13	0	UNL	7			41	35	58	27	00	0
16	0	UNL	5		H	40	35	60	27	03	8
19	3	UNL	5		H	32	30	82	27	06	5
22	7	30	5		H	31	30	85	27	08	5

DAY 09

Hour	Sky cover (tenths)	Ceiling (hnds. of ft.)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (°F)	Wet bulb (°F)	Rel. hum. (%)	Dew pt. (°F)	Wind dir	Wind speed (knots)
01	10	46	3		GF	32	31	85	28	09	6
04	10	28	4		GF	33	32	85	29	09	7
07	10	28	5		GF	35	33	85	31	09	7
10	10	100	3		H	36	33	76	29	10	8
13	10	90	5		RH	39	36	73	31	12	6
16	10	20	4		RH	38	36	79	32	12	7
19	10	40	7			38	35	76	31	13	5
22	10	60	8			37	35	79	31	14	5

DAY 10

Hour	Sky cover (tenths)	Ceiling (hnds. of ft.)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (°F)	Wet bulb (°F)	Rel. hum. (%)	Dew pt. (°F)	Wind dir	Wind speed (knots)
01	10	33	8		RW	37	35	82	32	17	5
04	10	16	4		RS	34	33	89	31	09	5
07	10	4	2		S	34	33	89	31	09	5
10	10	4	2		SF	34	33	89	31	08	5
13	10	4	0	12	SF	34	33	89	31	04	5
16	10	4	1		SF	34	33	89	31	05	7
19	10	3	1		SF	34	33	92	32	03	8
22	10	4	1		SF	34	34	96	33	34	5

DAY 11

Hour	Sky cover (tenths)	Ceiling (hnds. of ft.)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (°F)	Wet bulb (°F)	Rel. hum. (%)	Dew pt. (°F)	Wind dir	Wind speed (knots)
01	10	4	1	6	SF	33	32	92	31	32	11
04	10	4	1	8	SF	33	32	92	31	32	12
07	10	6	1	8	SF	32	31	92	30	31	14
10	10	10	0	10	SBS	26	25	88	23	28	15
13	10	10	0	12	SBS	22	21	85	18	29	20
16	10	15	1		SBS	20	19	86	16	30	14
19	10	6	0	12	SBS	22	21	88	19	29	13
22	10	6	1		SBS	19	19	92	17	27	13

DAY 12

Hour	Sky cover (tenths)	Ceiling (hnds. of ft.)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (°F)	Wet bulb (°F)	Rel. hum. (%)	Dew pt. (°F)	Wind dir	Wind speed (knots)
01	10	23	5		SBS	18	17	77	12	29	17
04	10	38	6		S	15	14	76	08	29	15
07	3	UNL	15			11	10	80	06	28	10
10	3	UNL	4		SWH	13	12	80	08	27	10
13	6	25	10			15	14	74	08	27	18
16	10	19	2		SW	18	17	81	13	26	9
19	10	17	7		SW	17	16	77	11	25	17
22	10	35	10		SW	16	15	84	12	24	7

DAY 13

Hour	Sky cover (tenths)	Ceiling (hnds. of ft.)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (°F)	Wet bulb (°F)	Rel. hum. (%)	Dew pt. (°F)	Wind dir	Wind speed (knots)
01	10	4	1		S	16	16	92	14	18	3
04	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
07	8	28	8		S	07	07	83	03	30	8
10	8	UNL	8			[illegible]	05	73	-01	27	8
13	6	30	10		S	[illegible]	[illegible]	58	-04	31	12
16	4	UNL	10			[illegible]	[illegible]	58	-04	[illegible]	7
19	[illegible]	[illegible]	[illegible]			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
22	0	UNL	15			00	00	68	-08	23	7

DAY 14

Hour	Sky cover (tenths)	Ceiling (hnds. of ft.)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (°F)	Wet bulb (°F)	Rel. hum. (%)	Dew pt. (°F)	Wind dir	Wind speed (knots)
01	0	UNL	15			01	00	69	-07	23	4
04	[illegible]	[illegible]	[illegible]			[illegible]	[illegible]	71	[illegible]	[illegible]	[illegible]
07	0	UNL	8			-01	-01	72	-08	22	6
10	3	UNL	10			05	04	63	-05	21	7
13	4	UNL	10			13	11	58	01	24	5
16	8	CIR	10			14	11	53	00	00	0
19	[illegible]	[illegible]	[illegible]			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
22	10	CIR	10			11	09	61	00	12	5

DAY 15

Hour	Sky cover (tenths)	Ceiling (hnds. of ft.)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (°F)	Wet bulb (°F)	Rel. hum. (%)	Dew pt. (°F)	Wind dir	Wind speed (knots)
01	10	CIR	10		[illegible]	11	09	67	02	09	4
04	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	77	[illegible]	[illegible]	[illegible]
07	10	33	5		S	20	19	77	14	13	8
10	10	25	1		S	22	21	81	17	12	6
13	10	10	1		SF	24	23	88	21	12	5
16	10	15	5		SH	26	25	81	21	29	6
19	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
22	10	21	8			23	22	85	19	27	6

DAY 16

Hour	Sky cover (tenths)	Ceiling (hnds. of ft.)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (°F)	Wet bulb (°F)	Rel. hum. (%)	Dew pt. (°F)	Wind dir	Wind speed (knots)
01	10	33	3		SW	23	22	81	18	27	5
04	10	19	1	8	SW	19	18	84	15	25	7
07	9	28	6		SW	11	11	88	08	25	5
10	8	25	1	8	SWH	17	18	84	14	26	6
13	7	25	2		SWH	21	19	74	14	31	7
16	8	UNL	8			20	17	62	09	00	0
19	10	100	12			20	18	74	13	14	5
22	3	UNL	12			15	14	80	10	12	5

DAY 17

Hour	Sky cover (tenths)	Ceiling (hnds. of ft.)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (°F)	Wet bulb (°F)	Rel. hum. (%)	Dew pt. (°F)	Wind dir	Wind speed (knots)
01	10	100	15			14	13	77	08	13	3
04	0	UNL	15			09	09	87	06	02	3
07	4	UNL	15			10	09	80	05	16	3
10	7	UNL	10			21	18	57	08	20	5
13	3	UNL	10			33	27	50	16	30	3
16	10	UNL	5		H	34	27	42	13	00	0
19	9	CIR	6		H	25	22	66	15	24	3
22	10	UNL	6		H	21	20	84	17	18	2

DAY 18

Hour	Sky cover (tenths)	Ceiling (hnds. of ft.)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (°F)	Wet bulb (°F)	Rel. hum. (%)	Dew pt. (°F)	Wind dir	Wind speed (knots)
01	10	CIR	10			19	18	84	15	23	3
04	6	UNL	10			22	20	71	14	17	2
07	8	CIR	10			29	25	61	17	17	7
10	10	100	10			41	35	53	25	20	13
13	9	CIR	10			47	38	44	26	20	10
16	10	120	10			47	39	46	27	29	6
19	10	120	10			44	38	56	29	26	10
22	10	46	10			38	35	73	30	29	6

DAY 19

Hour	Sky cover (tenths)	Ceiling (hnds. of ft.)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (°F)	Wet bulb (°F)	Rel. hum. (%)	Dew pt. (°F)	Wind dir	Wind speed (knots)
01	10	4	2		S	34	33	92	32	30	6
04	10	5	2		S	33	32	92	31	31	5
07	10	17	1	8	S	26	24	78	20	36	13
10	10	10	1		S	18	17	84	14	35	12
13	10	18	2	8	SW	18	16	71	10	31	12
16	7	25	10			16	14	71	08	27	9
19	0	UNL	12			08	07	76	02	24	6
22	0	UNL	12			10	09	76	04	22	5

DAY 20

Hour	Sky cover (tenths)	Ceiling (hnds. of ft.)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (°F)	Wet bulb (°F)	Rel. hum. (%)	Dew pt. (°F)	Wind dir	Wind speed (knots)
01	10	21	8		SW	14	13	74	07	24	4
04	10	20	2		SW	15	15	88	12	18	1
07	10	70	1	8	SW	18	17	84	14	26	11
10	2	UNL	7			18	17	77	12	25	15
13	8	25	8		SW	21	19	74	14	27	16
16	6	20	8		SW	19	17	71	11	24	18
19	6	25	6		SW	15	14	84	11	26	13
22	4	UNL	10		SW	16	15	81	11	26	11

DAY 21

Hour	Sky cover (tenths)	Ceiling (hnds. of ft.)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (°F)	Wet bulb (°F)	Rel. hum. (%)	Dew pt. (°F)	Wind dir	Wind speed (knots)
01	0	UNL	15			18	17	74	11	26	14
04	0	UNL	15			15	13	67	06	26	10
07	4	UNL	10			12	11	84	08	25	6
10	10	30	6		SWH	18	17	77	12	25	14
13	10	25	2	8	SW	23	22	78	17	26	13
16	10	23	7		SW	25	23	75	18	27	15
19	10	25	10		SW	25	23	78	19	25	9
22	10	33	12			27	25	78	21	26	10

DAY 22

Hour	Sky cover (tenths)	Ceiling (hnds. of ft.)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (°F)	Wet bulb (°F)	Rel. hum. (%)	Dew pt. (°F)	Wind dir	Wind speed (knots)
01	10	23	10			31	29	75	24	22	7
04	10	23	15			38	32	53	22	25	20
07	3	UNL	15			38	36	79	32	25	17
10	10	CIR	12			41	37	68	31	28	25
13	10	CIR	12			42	37	60	29	26	18
16	0	UNL	10			41	36	65	30	25	16
19	3	UNL	10			39	35	67	29	27	15
22	7	55	15			35	31	62	23	29	19

DAY 23

Hour	Sky cover (tenths)	Ceiling (hnds. of ft.)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (°F)	Wet bulb (°F)	Rel. hum. (%)	Dew pt. (°F)	Wind dir	Wind speed (knots)
01	10	25	5		SW	31	28	66	21	28	17
04	8	46	10			22	19	55	08	31	15
07	3	UNL	15			16	14	64	06	31	13
10	10	40	12			18	16	66	09	30	17
13	8	25	15			20	17	60	08	30	20
16	8	150	15			25	21	50	09	30	15
19	5	UNL	15			23	20	65	13	24	7
22	0	UNL	15			24	22	68	15	20	7

DAY 24

Hour	Sky cover (tenths)	Ceiling (hnds. of ft.)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (°F)	Wet bulb (°F)	Rel. hum. (%)	Dew pt. (°F)	Wind dir	Wind speed (knots)
01	2	UNL	10			30	26	58	17	25	15
04	2	UNL	10			32	28	61	20	22	10
07	6	UNL	10			31	28	69	22	24	10
10	3	UNL	12			36	32	64	25	26	12
13	3	UNL	12			38	34	65	27	25	13
16	8	120	10			39	34	62	27	25	12
19	10	70	10			37	34	73	29	23	7
22	10	40	10			37	34	76	30	25	8

DAY 25

Hour	Sky cover (tenths)	Ceiling (hnds. of ft.)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (°F)	Wet bulb (°F)	Rel. hum. (%)	Dew pt. (°F)	Wind dir	Wind speed (knots)
01	10	23	10			37	34	76	30	24	7
04	10	7	6		SW	33	32	89	30	34	17
07	10	15	7		SW	28	26	72	20	31	14
10	10	25	8		SW	22	20	68	13	32	14
13	8	15	4		SWBS	15	14	77	09	30	18
16	9	20	1		SWBS	09	09	84	05	29	25
19	10	20	0	12	SWBS	06	06	87	03	29	13
22	10	20	2		SWBS	05	04	76	-01	31	12

DAY 26

Hour	Sky cover (tenths)	Ceiling (hnds. of ft.)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (°F)	Wet bulb (°F)	Rel. hum. (%)	Dew pt. (°F)	Wind dir	Wind speed (knots)
01	10	20	5		SW	05	04	69	-03	32	7
04	2	UNL	7			00	00	72	-07	24	4
07	8	UNL	10			01	00	69	-07	25	5
10	0	UNL	15			07	06	69	-01	23	9
13	5	UNL	15			14	11	40	-08	24	8
16	9	UNL	15			18	14	37	-04	15	11
19	10	100	15			18	14	45	00	11	7
22	10	80	15			18	15	49	02	14	5

DAY 27

Hour	Sky cover (tenths)	Ceiling (hnds. of ft.)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (°F)	Wet bulb (°F)	Rel. hum. (%)	Dew pt. (°F)	Wind dir	Wind speed (knots)
01	4	UNL	15			18	16	71	10	14	8
04	5	UNL	15			20	17	62	09	13	5
07	10	CIR	15			23	20	57	10	14	5
10	10	30	4		S	27	25	78	21	20	7
13	10	30	10			34	30	62	22	20	13
16	10	30	10		SW	30	28	78	24	25	20
19	10	28	10		SW	27	24	69	18	24	17
22	10	28	10			24	22	68	15	24	11

DAY 28

Hour	Sky cover (tenths)	Ceiling (hnds. of ft.)	Visibility whole miles	Visibility 16ths mile	Weather	Dry bulb (°F)	Wet bulb (°F)	Rel. hum. (%)	Dew pt. (°F)	Wind dir	Wind speed (knots)
01	10	33	12			23	21	68	14	25	12
04	10	33	12			21	19	71	13	25	10
07	10	38	5		SW	22	20	71	14	26	11
10	10	30	1	8	SW	22	21	81	17	27	11
13	10	30	8			24	22	68	15	28	15
16	7	30	10			27	24	63	16	27	13
19	0	UNL	10			23	21	71	15	28	7
22	0	UNL	10			17	16	81	12	23	5

NOTES

CEILING COLUMN

UNL indicates an unlimited ceiling

CIR indicates a cirriform cloud ceiling of unknown height

WEATHER COLUMN

- * Tornado
- T Thunderstorm
- Q Squall
- R Rain
- RW Rain showers
- ZR Freezing rain
- L Drizzle
- ZL Freezing drizzle
- S Snow
- SP Snow pellets
- IC Ice crystals
- SW Snow showers
- SG Snow grains
- E Sleet
- A Hail
- AP Small hail
- F Fog
- IF Ice fog
- GF Ground fog
- BD Blowing dust
- BN Blowing sand
- BS Blowing snow
- BY Blowing spray
- K Smoke
- H Haze
- D Dust

WIND COLUMNS

Directions are those from which the wind blows, indicated in tens of degrees from true North, i.e., 09 for East, 18 for South, 27 for West. Entry of 00 in the direction column indicates calm.

Speed is expressed in knots; multiply by 1.15 to convert to miles per hour

ADDITIONAL DATA
Other observational data contained in records on file can be furnished at cost via microfilm or microfiche copies of the original records. Inquiries as to availability and costs should be addressed to: Director, National Weather Records Center, Federal Building, Asheville, N. C. 28801

STATION: ROCHESTER N Y   YEAR & MONTH: 70 02

APPENDIX C

EXTENDED CORRELATION BANDWIDTH PROGRAM

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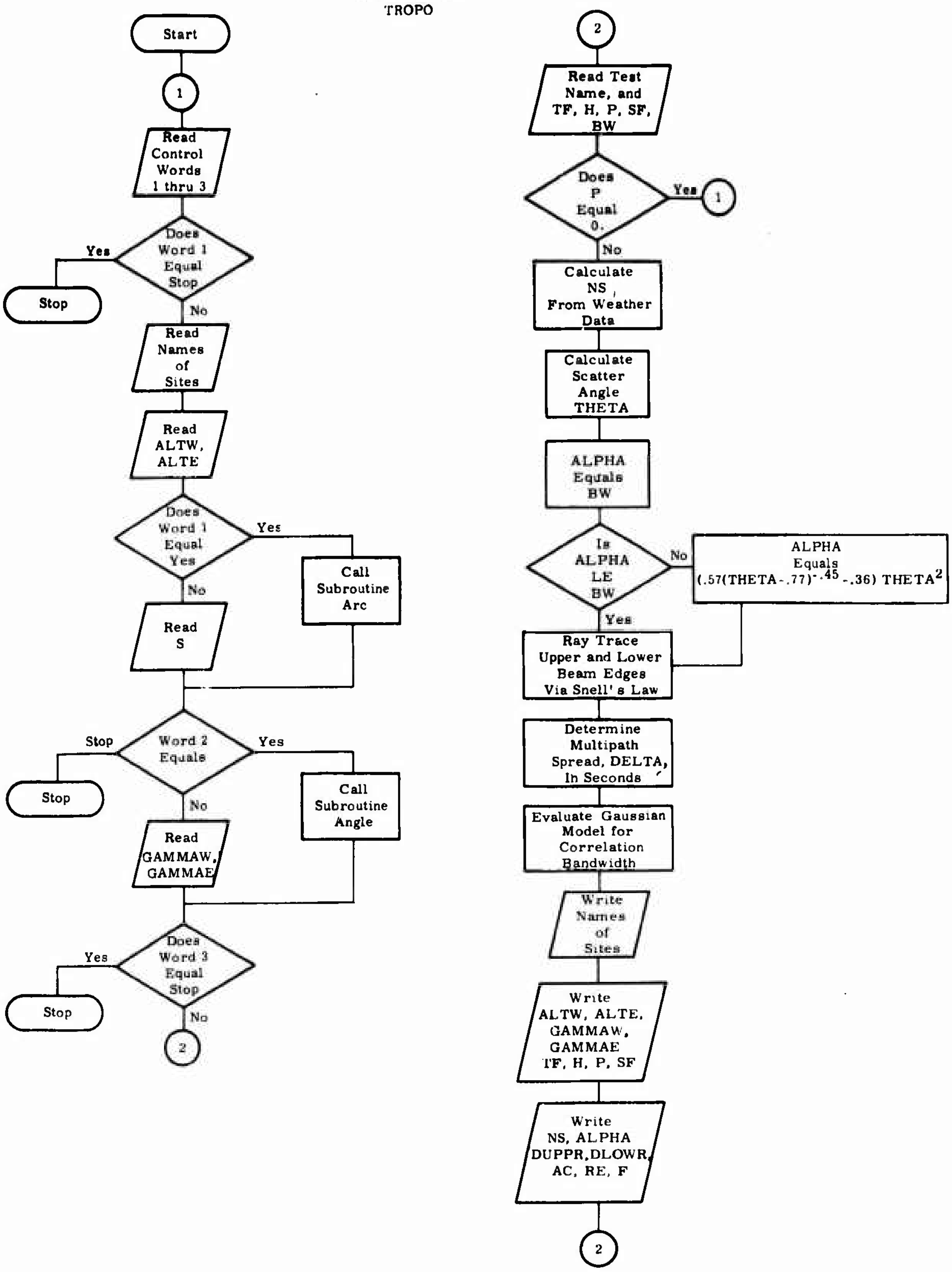
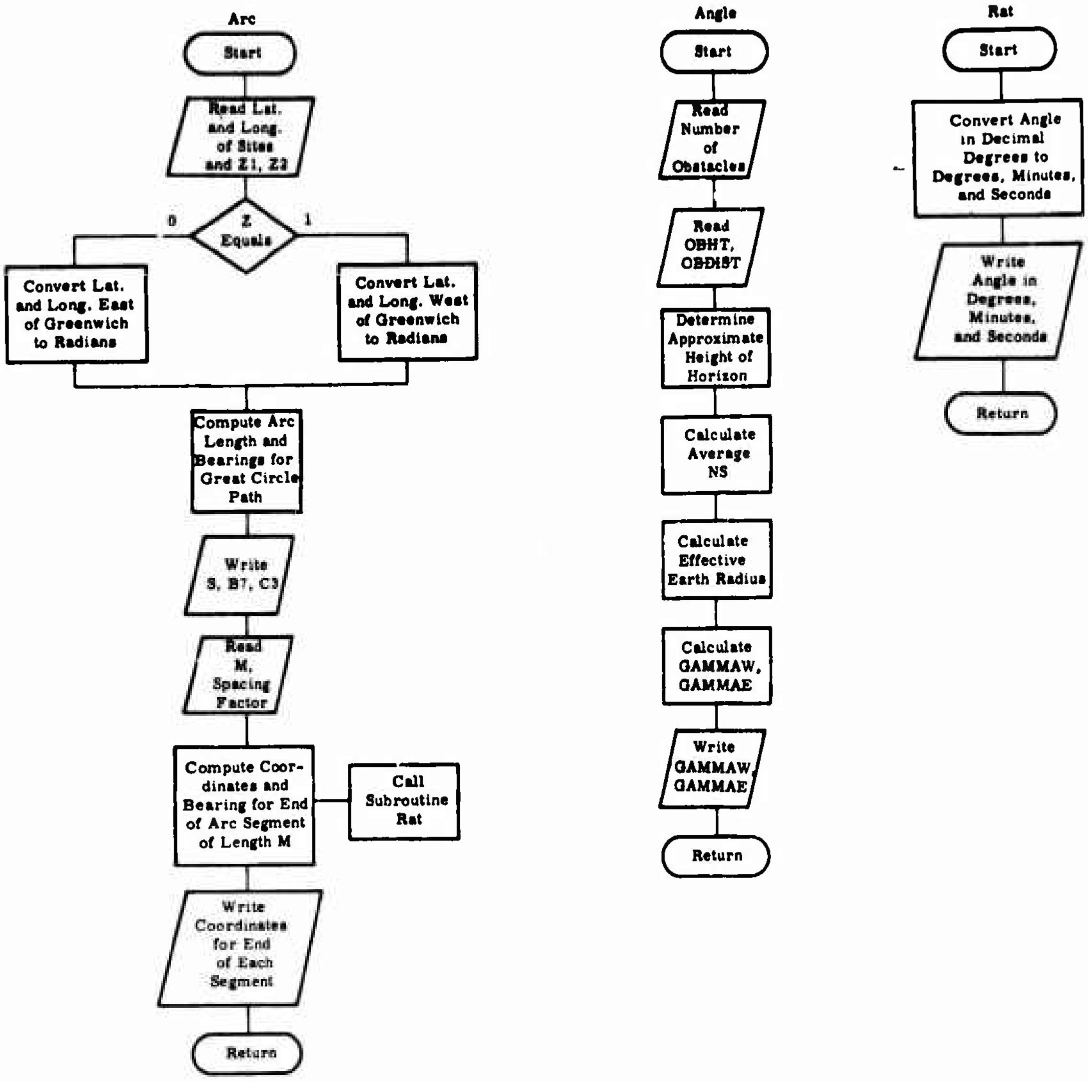
MAIN PROGRAM
TROPO



SUBROUTINES



MAIN PROGRAM: TROPO

Inputs:

ALTW=altitude in meters above sea level of western most station
ALTE=altitude in meters above sea level of eastern most station
TF=temperature in degrees F.
H=humidity in percent
P=atmospheric pressure in inches mercury
BW=antenna beam width in degrees
SF=scale factor related to condition of the troposphere

Calculated in subroutines or input:

S=distance in kilometers between sites on great circle path
GAMMAW=angle in radians between tangent ray and lower ray over obstacles for western most site
GAMMAE=angle in radians between tangent ray and lower ray over obstacles for eastern most site

Outputs:

NS=surface refractivity
ALPHA=effective antenna beam width in radians
SUPPR=upper ray length in kilometers
SLOWR=lower ray length in kilometers
AC=multipath spread in microseconds
THETA=scatter angle in radians
RE=envelope correlation function
F=frequency separation in MHz

SUBROUTINE: ARC

Inputs:

Longitude and latitude in degrees, minutes, and seconds of western most site
Longitude and latitude in degrees, minutes, and seconds of eastern most site
Z1, Z2=codes for sites east or west of Greenwich
M=increment in miles along great circle path for print out of bearing and distance

Outputs:

S=distance in kilometers between sites on great circle path
B7=bearing east in degrees for great circle path
C3=bearing west in degrees for great circle path

SUBROUTINE: ANGLE

Inputs:

OBHT=height of obstacle in meters above sea level
OBDIST=distance in meters from site to obstacle

Outputs:

GAMMAW=angle in radians between tangent ray and lower ray over obstacles for western most site
GAMMAE=angle in radians between tangent ray and lower ray over obstacles for eastern most site

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C     PROGRAM TROPO(INPUT,TAPE 5=INPUT,OUTPUT,TAPE 6=OUTPUT,PUNCH)
      DIMENSION RF(9),TEST(3),WORD(3),SITEW(4),SITEE(4),SUMW(2000),
     1WHT(2000)
      DIMENSION ACT(9)
      REAL K1,K2,K3,K4,N,NS
C  PREDICTION OF CORRELATION BANDWIDTH BASED
C  ON LINK PARAMETERS,WEATHER AND TROPOSPHERE CONDITION
C     WITH OPTIONS TO CALCULATE BEARINGS AND PATH-LENGTH BETWEEN SIGHTS OR
C     TAKE OFF ANGLES
      DATA YES/3HYES/, CHECK/4HSTOP/
      CON2=.0174533
      CONFAC=57.29578
C     WORD(1)=STOP STOP BEFORE ARC, =YES CALL ARC, =BLANK OR NO READ S.
C     WORD(2)=STOP STOP BEFORE ANGLE,=YES CALL ANGLE,=BLANK OR NO READ ALT AND
C     ANGLES.
C     WORD(3)=STOP STOP BEFORE NS CALCULATION, YES CALCULATE CORRELATION
C     COEFFICIENTS.
   99 READ(5,100) (WORD(INF),INF=1,3)
  100 FORMAT(3(A4,6X))
      IF(WORD(1).EQ.CHECK) STOP
C     SITEW IS NAME OF WESTERN SITE, SITEE IS NAME OF EASTERN SITE.
      READ(5,101) (SITEW(INF),INF=1,4),(SITEE(INF),INF=1,4)
  101 FORMAT(4A4,4X,4A4)
C      ALTW=HEIGHT IN METERS ABOVE SEA LEVEL OF WESTERN STATION.
C      ALTE=HEIGHT IN METERS ABOVE SEA LEVEL OF EASTERN STATION.
  129 READ(5,7004) ALTW,ALTE
 7004 FORMAT(F7.2,3X,F7.2)
      IF(WORD(1)-YES) 130,110,130
  110 CALL ARC(S,SITEW,SITEE)
      GO TO 135
C  S=DISTANCE BETWEEN SITES IN KILOMETERS
  130 READ(5,120) S
  120 FORMAT(F10.2)
  135 CONTINUE
      IF(WORD(2).EQ.CHECK) GO TO 99
      IF(WORD(2)-YES) 150,140,150
  140 CALL ANGLE(GAMMAW,GAMMAE,ALTW,ALTE,SITEW,SITEE)
      GO TO 170
C      GAMMAW=ANGLE IN RADIANS FROM TANGENT TO LOWER RAY FOR WESTERN STATION.
C      GAMMAE=ANGLE IN RADIANS FROM TANGENT TO LOWER RAY FOR EASTERN STATION.
```

```
  150 READ(5,160) GAMMAW,GAMMAE
  160 FORMAT(2F10.6)
  170 IF(WORD(3).EQ.CHECK) STOP
C       TEST=TEST IDENTITY, TF=TEMPERATURE IN DEGREES F., H=HUMIDITY IN
C      PERCENT, P=ATMOSPHERIC PRESSURE IN INCHES MERCURY, SF=SCALE FACTOR,
C      VARIES FROM 1. FOR TURBULENT CONDITIONS TO .4 FOR LAYERING.
C      BW=ANTENNA HALF POWER BEAMWIDTH IN DEGREES
300    READ(5,250) TEST,TF,H,P,SF,BW
250    FORMAT(3A4,3X,F10.2,3X,F10.2,3X,F10.3,14X,F8.3,2X,F5.2)
       IF(P .EQ.0.) GO TO 99
C      CALCULATE SCATTER ANGLE, THETA, FOR 4/3'S EARTH
       EFRAD=8493.333
       THETA=(GAMMAW+GAMMAE+S/EFRAD)*CONFAC
C      CALCULATE BEAMWIDTH,ALPHA
       IF(THETA.LE..77) GO TO 1008
       ALPHA=((.57*(THETA-.77)**-.45)-.36)*THETA**2.
       IF(ALPHA.LE.BW) GO TO 1089
 1008 ALPHA=BW
 1089 ALPHA=ALPHA/57.296
       DELDEG=S/(2000.*6370.)
C   TF=TEMPERATURE IN DEGREES FAHRENHEIT
C   CONVERT TO DEGREES CENTIGRADE, TC
       TC=(5./9.)*(TF-32.)
C   P=ATMOSPHERIC PRESSURE IN INCHES MERCURY
C   CONVERT TO MILLIBARS, PM
       PM=P*33.86
C   H=RELATIVE HUMIDITY IN PERCENT
C   PW= SATURATED WATER VAPOR PRESSURE IN MILLIBARS
       PW=13.2*EXP(0.0391*TC)
C   COMPUTATION OF NS
       K1=77.6
       K2=48.1
       RAT=PM+((K2*H*PW)/(273.+TC))
       NS=(K1*RAT)/(273.+TC)
C      RAY TRACE FIRST LOWER THEN UPPER RAY, DETERMINE INTERSECTION OF EAST
C       AND WEST RAYS AND FIND LENGTH OF UPPER AND LOWER PATH.
       DNDR=7.32*EXP(.005577*NS)
       K3=1.-(6370.*DNDR*1.E -6)
       DO 25 IR=1,2
       ICAL=1
```

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      GO TO (1002,1003),IR
1002  ANG   =GAMMAW
      GO TO 1006
1003  ANG   =GAMMAW+ALPHA
1006  R0=6370.+ALTW*.001
1007  R1=R0
      SW=0.
      DO 10 K=1,2000
      AI=FLOAT(K)
      BSQ=(AI*DELDEG)**2
      K4=ANG*AI*DELDEG
      BBB=K4+(0.5*K3*BSQ)
      R2=R0*EXP(BBB)
      X=R2-R1
      Y=R1*DELDEG
      DS=SQRT((X**2)+(Y**2))
      SW=SW+DS
9000  IF(ICAL.EQ.2) GO TO 108
      SUMW(K)=SW
      WHT(K)=R2
 109  GO TO 119
 108  IF(R2.LT.WHT(2000-K)) GO TO 119
      SL=SW+SUMW(2000-K)
      GO TO 21
 119  CONTINUE
  10  R1=R2
      IF(ICAL.EQ.2) GO TO 21
      GO TO (1011,1012),IR
1011  ANG   =GAMMAE
      GO TO 1009
1012  ANG   =GAMMAE+ALPHA
1009  R0=6370.+ALTE*.001
      ICAL=2
      GO TO 1007
  21  GO TO (22,23),IR
  22  DLOWR=SL
      HTL=(R2-6370.)*1000.
      GO TO 25
  23  DUPPR=SL
      HTU=(R2-6370.)*1000.
```

```
   25 CONTINUE
C     DETERMINE MULTIPATH SPREAD, DELTA IN SECONDS
      DELTA=(DUPPR-DLOWR)/(3.0 E+5)
      GAMWD=CONFAC*GAMMAW
      GAMED=CONFAC*GAMMAE
      ALPHAD=CONFAC*ALPHA
      THETAR=THETA/CONFAC
      BWR=CON2*BW
      SM=S*.62137
      DIFF=DUPPR-DLOWR
      WRITE(6,40) SITEW,SITEE
40    FORMAT(1H1,10X,67HPREDICTION OF ENVELOPE CORRELATION FUNCTION FOR
     1A TROPOSCATTER PATH//,11X,'FOR WESTERN MOST SITE ',4A4,' AND EASTE
     1RN MOST SITE ',4A4//)
C     RICE MODEL FOR CORRELATION BANDWIDTH (GAUSSIAN MODEL)
      DO 30 J=1,9
      Z=FLOAT(J)*1.E+6
      RE(J)=EXP(-((4.06*SF*Z*DELTA)**2))
30    CONTINUE
      WRITE(6,7006) SITEW,ALTW,SITEE,ALTE,GAMMAW,GAMMAE,GAMWD,GAMED
 7006 FORMAT( /11X    ,'ALTITUDE OF ',4A4,' = ',F6.2,' METERS ABOVE SEA L
     1EVEL',//11X,'ALTITUDE OF ',4A4,' = ',F6.2,' METERS ABOVE SEA LEVEL
     2',///11X,'GAMMAW=',F10.6,' RADIANS',10X,'GAMMAE=',F10.6,' RADIANS'
     3,/18X,F7.3,'     DEGREES',17X,F7.3,'     DEGREES'//)
      WRITE(6,102)S,SM,TEST,PM,P
  102 FORMAT(11X,'DISTANCE BETWEEN SITES=',F8.3,' KILOMETERS =',5X,F8.3,
     9                                                                ' M
     1ILES',///11X,'TEST NO. ',3A4,10X,'ATMOSPHERIC PRESSURE=',F8.2,' MI
     2LLIBARS',/63X,F8.2,' INCHES OF MERCURY'//)
      WRITE(6,90)TF,H,SF
   90 FORMAT(11X,'TEMPERATURE=',F6.2,' DEGREES F.',10X,'HUMIDITY=',F6.2,
     1' PERCENT',10X,'SCALE FACTOR=',F8.3//)
      WRITE(6,50) NS,ALPHA,BWR,      ALPHAD,BW
   50 FORMAT(11X,3HNS=,F7.1,5X,'ALPHA, EFFECTIVE BEAM WIDTH=',F10.5,   '
     1RADIANS',5X,'ACTUAL BEAM WIDTH=',F10.5, ' RADIANS'
     2,/54X,F8.3,'    DEGREES',23X,F8.3,'    DEGREES')
      WRITE(6,26) DLOWR,DUPPR,DIFF
   26 FORMAT(// 11X,'LOWER RAY LENGTH=',F12.4,' KILOMETERS',5X,'UPPER RAY
     1Y LENGTH=',F12.4,' KILOMETERS',5X,'DIFFERENCE=',F8.4,' KILOMETERS'
     1)
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      AC=DELTA*1.E +6
      WRITE(6,11111) HTL,HTU
11111 FORMAT(//11X,'HEIGHT OF LOWER RAY INTERSECTION=',F6.1, ' METERS',1
     10X,'HEIGHT OF UPPER RAY INTERSECTION=',F6.1,' METERS')
      WRITE(6,151)AC,THETAR,THETA
  151 FORMAT(//11X,'MULTIPATH SPREAD=',F10.5,' MICROSECONDS',10X,'SCATTE
     1R ANGLE=',F10.5,' RADIANS',/75X,F8.3,'    DEGREES'//)
      WRITE(6,60)
   60 FORMAT(11X,'FREQUENCY SEPARATION',8X,'CORRELATION COEFFICIENT',7X,
     1'ACTUAL',/18X,'IN MHZ',20X,'PREDICTED BY',12X,'CORRELATION',/43X,
     2'GAUSSIAN MODEL',11X,'COEFFICIENT'//)
      READ(5,8005) ACT
 8005 FORMAT(9(F4.2,3X))
      DO 70 I=1,9
      WRITE(6,80) I,RE(I),ACT(I)
   80 FORMAT(20X,I2,26X,F4.3,19X,F4.2/)
70    CONTINUE
      GO TO 300
      END


      SUBROUTINE ANGLE(GAMMAW,GAMMAE,ALTW,ALTE,SITEW,SITEE)
      DIMENSION NUOB(2),SITEW(4),SITEE(4),OBHT(10,2),OBDIST(10,2),HOR1(2)
     1),EFALT(2)
C     CONSTANTS USED IN T/O ANGLE CALCULATION
      RAD=6370.
      CONFAC=57.296
C     NUOB=NUMBER OF OBSTACLES FIRST FOR WESTERN THEN FOR EASTERN STATION
      WRITE(6,7000) SITEW,SITEE
 7000 FORMAT(1H1,////10X,'TAKE OFF ANGLE CALCULATION FOR PATH BETWEEN ',
     14A4,' AND ',4A4///)
      READ(5,7005) (NUOB(J),J=1,2)
 7005 FORMAT(2I10)
      GAMMAE=0.
      GAMMAW=0.
      DO 7012 J=1,2
      ISTOP=NUOB(J)
      HOR1(J)=0.
      DO 7011 I=1,ISTOP
C     OBHT=HEIGHT OF OBSTACLE IN METERS.  OBDIST=DISTANCE TO OBSTRUCTION FROM
C     SITE IN METERS, WESTERN FIRST.
      READ(5,7010) OBHT(I,J),OBDIST(I,J)
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7010 FORMAT(2(F10.1,5X))
     HOR2=OBHT(I,J)/OBDIST(I,J)
     IF(HOR1(J).GT.HOR2)  GO TO 7011
     IO=I
     HOR1(J)=HOR2
7011 CONTINUE
     EFALT(J)=OBHT(IO,J)
     IF(J.EQ.1) GO TO 7014
     ALT=ALTE
     GO TO 7015
7014 ALT=ALTW
7015 IF((EFALT(J)-ALT).LT.150) GO TO 7012
     EFALT(J)=ALT
7012 CONTINUE
     SNS=310.*EXP(-.1057*EFALT(1)*.001)
     FNS=310.*EXP(-.1057*EFALT(2)*.001)
     AVNS=(FNS+SNS)/2.
     EFRAD=RAD/(1.-.04665*EXP(.005577*AVNS))
     DO 7200 J=1,2
     ISTOP=NUOB(J)
     IL=1
     IF(J.EQ.2) GO TO 7008
     HTST=ALTW
     GO TO 7009
7008 HTST=ALTE
7009 GAMMA1=-10.
     DO 7120 I=1,ISTOP
     GAMMA2=((OBHT(I,J)-HTST)/OBDIST(I,J))-((OBDIST(I,J)*.001)/(2.*EFRAD
    1D))
     IF(GAMMA2.LE.GAMMA1) GO TO 7140
     GAMMA1=GAMMA2
7140 CONTINUE
     IF(IL.EQ.2) GO TO 7100
     IF(J.EQ.2) GO TO 7105
     WRITE(6,7104) SITEW
7104  FORMAT(///5X,'OBSTACLES FROM SITE ',4A4//)
     IL=2
     GO TO 7100
7105 WRITE(6,7104) SITEE
     IL=2
```

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7100 WRITE(6,7110) GAMMA1,OBHT(I,J),OBDIST(I,J)
7110 FORMAT(      5X,'GAMMA=',F9.6,' RADIANS',10X,'OBJECT HEIGHT=',F10.
    12,' METERS',10X,'OBJECT DISTANCE=',F10.2,' METERS')
7120 CONTINUE
     IF(J.EQ.2) GO TO 7150
     GAMMAW=GAMMA1
     GO TO 7200
7150 GAMMAE=GAMMA1
7200 CONTINUE
     DWTOA=GAMMAW*CONFAC
     DETOA=GAMMAE*CONFAC
     PUNCH 7198, GAMMAW,GAMMAE,          (SITEW(IS),IS=1,2),(SITEE(IS),
    1IS=1,2)
7198 FORMAT(2F10.6,15X,'ANGLES',3X,2A4,3X,2A4)
     WRITE(6,7199) SITEW,GAMMAW,DWTOA,SITEE,GAMMAE,DETOA
7199 FORMAT(///10X,'ANGLE BETWEEN TANGENT AND LOWER RAY AT ',4A4,' = ',
    1F9.6,' RADIANS OR ',F7.2,' DEGREES',//10X,'ANGLE BETWEEN TANGENT A
    2ND LOWER RAY AT ',4A4,' = ',F9.6,' RADIANS OR ',F7.2,' DEGREES')
C    CALCULATIONS NOT VALID FOR ANGLE GREATER THAN .2 RADIANS
     RETURN
     END


     SUBROUTINE ARC(S ,SITEW,SITEE)
     DIMENSION SITEW(4),SITEE(4)
     INTEGER Z1,Z2
     REAL K1,K2,K3,K4,LNED,LNEM,LNES,LTED,LTEM,LTES,LNWD,LNWM,LNWS,LTWD
    1,LTWM,LTWS,M
C    GREAT CIRCLE CALCULATION FOR NORTHERN HEMISPHERE
C    ENTER LONG. AND LAT. OF MOST WESTERN STATION
C    IF WEST OF GREENWICH Z1=1, IF EAST Z1=0
C    LN=LONG.,LT.=LAT.,W=WEST,E=EAST,D=DEGREES,M=MINUTES,S=SECONDS
     READ(5,10)LNWD,LNWM,LNWS,LTWD,LTWM,LTWS,Z1
10   FORMAT(6F12.2,2X,I2)
C    ENTER LONG. AND LAT. OF MOST EASTERN STATION
C    IF WEST OF GREENWICH Z2=1, IF EAST Z2=0
     READ(5,20)LNED,LNEM,LNES,LTED,LTEM,LTES,Z2
20   FORMAT(6F12.2,2X,I2)
C    CONSTANTS USED IN PROGRAM
     P=3.14159265
     K1=0.0174532925
     K2=1.57079632
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      K3=1.15078
      K4=1.852
C     W1=WESTERN STN. LONG. IN RADIANS
C     W2=WESTERN STN. LAT. IN RADIANS
      W1=(LNWD+(LNWM/60.)+(LNWS/3600.))*K1
      W2=K2-(LTWD+(LTWM/60.)+(LTWS/3600.))*K1
C     E1=EASTERN STN. LONG. IN RADIANS
C     E2=EASTERN STN. LAT. IN RADIANS
      E1=(LNED+(LNEM/60.)+(LNES/3600.))*K1
      E2=K2-(LTED+(LTEM/60.)+(LTES/3600.))*K1
      E3=SIN(E2)
      E4=COS(E2)
C     IF EAST OF GREENWICH WE CHANGE ANGLE DATA
      IF(Z1.EQ.0)GO TO 30
C     WE ARE WEST OF GREENWICH FOR WESTERN STN.
      IF(Z2.EQ.1)GO TO 40
C     WESTERN STN. IS WEST OF GREENWICH AND EASTERN STN. IS EAST OF
C     GREENWICH.  WE NOW CORRECT FOR EASTERN LONGITUDE.
      E1=-E1
      GO TO 40
C     CORRECT EASTERN AND WESTERN ANGLES
30    W1=2.*P-W1
      E1=2.*P-E1
C     COMPUTE ANGLE BETWEEN LONGITUDES
40    A1=W1-E1
      W3=COS(W2)
      W4=SIN(W2)
C     COMPUTE COS OF ARC BETWEEN STATIONS
      A2=W3*E4+W4*E3*COS(A1)
C     COMPUTE ARC BETWEEN STATIONS, GOOD TO 90 DEGREES
      X=SQRT(1./(A2**2)-1.)
      A3=ATAN(X)
C     CONVERT ARC TO STATUTE MILES
      A4=69.055*A3/K1
C     CONVERT ARC TO NAUTICAL MILES
      A5=A4/K3
C     CONVERT ARC TO KILOMETERS
      A6=A5*K4
      S=A6
C     BEARING COMPUTATION
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```
      A7=(W2+E2+A3)/2.0
      A8=SIN(A7-A3)
      A9=SIN(A7-W2)
      B1=SIN(A7-E2)
      B2=SIN(A3)
C     BEARING EAST HALF ANGLE TRIG. FUNCTION
      Y=(A8*A9/(B2*W4))
      B3=SQRT(Y)
C     BEARING EAST WHOLE ANGLE IN RADIANS
      Z=(1./(B3**2)-1.)
      B4=2.*ATAN(1./SQRT(Z))
C     BEARING EAST WHOLE ANGLE IN DEGREES
      B7=B4/K1
C     BEARING WEST HALF ANGLE TRIG. FUNCTION
      A=(A8*B1/(B2*E3))
      C1=SQRT(A)
C     BEARING WEST WHOLE ANGLE IN RADIANS
      AA=1./SQRT(1./C1**2-1.)
      C2=2.*ATAN(AA)
C     BEARING WEST WHOLE ANGLE IN DEGREES
      C3=360.-C2/K1
      WRITE(6,50) SITEW,SITEE
   50 FORMAT(1H1,10X,24HGREAT CIRCLE COMPUTATION, ' BETWEEN WESTERN MOST
     1 SITE ',2X,4A4,' AND EASTERN MOST SITE',3X,4A4///)
      WRITE(6,6000) SITEW,LNWD,LNWM,LNWS,LTWD,LTWM,LTWS,SITEE,LNED,LNEM,
     1LNES,LTED,LTEM,LTES
 6000 FORMAT(11X,'POSITION OF WESTERN MOST SITE ',4A4,'  LONGITUDE=',F6.
     12,' DEGREES ',F6.2,' MINUTES ',F6.2,' SECONDS',/59X,'LATITUDE=',F6
     9.2,                                                               '
     2DEGREES ',F6.2,' MINUTES ',F6.2,' SECONDS',//11X,'POSITION OF EAST
     3ERN MOST SITE ',4A4,'  LONGITUDE=',F6.2,' DEGREES ',F6.2,' MINUTES
     8 ',                                                              F6
     4.2,' SECONDS',/59X,'LATITUDE=',F6.2,' DEGREES ',F6.2,' MINUTES ',F
     56.2,' SECONDS'//)
      WRITE(6,60)A4,A5
60    FORMAT(1H ,10X,26HDISTANCE BETWEEN STATIONS=,F12.2,2X,14HSTATUTE M
     1ILES=,F12.2,2X,14HNAUTICAL MILES//)
      WRITE(6,70)A6
70    FORMAT(1H ,40X,1H=,F12.2,2X,11HKILOMETERS.//)
      PUNCH 71, A6,SITEW,SITEE
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   71 FORMAT(F10.2,5X,'PATH LENGTH',5X,4A4,5X,4A4)
      WRITE(6,80)B7,C3
80    FORMAT(1H ,10X,24HBEARING EAST IN DEGREES=,F10.2,10X,24HBEARING WE
     1ST IN DEGREES=,F10.2//)
      READ(5,90)M
90    FORMAT(F12.2)
      WRITE(6,100)M
100   FORMAT(1H ,31HCOORDINATES ALONG THE ARC EVERY,F12.2,2X,13HSTATUTE
     1MILES//)
      N=0
      IF(M.EQ.0)GO TO 190
      B1=COS(B4)
      IF(M-A4)160,160,170
160   GO TO 200
170   WRITE(6,180)
180   FORMAT(1H ,10X,28HMILES GREATER THAN ARC - END///)
      GO TO 190
200   N=N+1
      AAA=N*M
      IF(AAA-A4)250,250,190
  250 WRITE(6,225)N,AAA
225   FORMAT(1H ,10X,3HNO.,I4,2X,5HPOINT,10X,F12.2,2X,16HMILES ALONG PAT
     1H//)
      D1=AAA*K1/69.055
      W5=COS(D1)
      W6=SIN(D1)
      B2=W5*W3+W6*W4*COS(B4)
      B2=ATAN(SQRT(1./(B2**2)-1.))
      B3=SIN(B2)
      B5=K2-B2
      O1=B5/K1
      WRITE(6,275)O1
275   FORMAT(1H ,10X,14HNORTH LATITUDE,F10.2,3X,3HDEG//)
      CALL RAT(O1)
      B6=SIN(B4)
      A2=B6*W6/B3
      A3=ATAN(1./SQRT(1./(A2**2)-1.))
      A5=(W1-A3)/K1
      IF(Z1.EQ.0)GO TO 880
      IF(A5.LT.0)GO TO 900
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      WRITE(6,300)
300   FORMAT(1H ,10X,14HWEST LONGITUDE//)
      GO TO 910
880   A5=360.-A5
      WRITE(6,325)
325   FORMAT(1H ,10X,14HEAST LONGITUDE//)
      GO TO 910
900   A5=-A5
      WRITE(6,350)
350   FORMAT(1H ,10X,14HEAST LONGITUDE//)
910   O1=A5
      WRITE(6,375)O1
375   FORMAT(1H ,10X,F12.2,3X,3HDEG//)
      CALL RAT(O1)
      A6=(D1+B2+W2)/2.
      A7=SIN(A6-B2)
      A8=SIN(A6-D1)
      A9=SQRT(A7*A8/(B3*W6))
      E5=2.*ATAN(1./SQRT(1./(A9**2)-1.))
      E5=360.-E5/K1
      WRITE(6,400)E5
400   FORMAT(1H ,10X,12HBEARING WEST,F12.2//)
      BB=E5-180.
      WRITE(6,425)BB
425   FORMAT(1H ,10X,12HBEARING EAST,F12.2//)
      GO TO 200
190   WRITE(6,191)
191   FORMAT(1H ,10X,26HNO MORE CALCULATIONS - END///)
      RETURN
      END


      SUBROUTINE RAT(O1)
      I1=O1
      O3=(O1-I1)*60.
      I3=O3
      O5=(O3-I3)*60.
      WRITE(6,500)I1,I3,O5
500   FORMAT(1H ,10X,I10,2X,3HDEG,10X,I10,2X,3HMIN,10X,F10.2,2X,3HSEC//)
      RETURN
      END
```

APPENDIX D

TEST RECORDS

TEST RECORD
ONTARIO CENTER, SUMMER

X-BAND

TEST	WEATHER	RECEIVE SITE TEMP DEGREES F.	RECEIVE SITE REL HUM PERCENT	RECEIVE SITE BARO PRES INCHES MERCURY	RECEIVE SITE WIND SPEED KNOTS	WEATHER	TRANSMIT SITE TEMP DEGREES F.	TRANSMIT SITE REL HUM PERCENT	TRANSMIT SITE BARO PRES INCHES MERCURY	TRANSMIT SITE WIND SPEED KNOTS	SIGNAL STRG -DBM	CLOUD LEVEL FEET
0805102001WX	HAZY	78 TO 81	51	29.99	9	STRATUS CLOUDING	82 TO 85	51	29.99	10	76.3	
0805110002WX	HAZY	78 TO 81	51	29.99	9	STRATUS CLOUDING	82 TO 85	51	29.99	10	76.4	
0805141003WX	HAZY	78 TO 81	51	29.99	9	STRATUS CLOUDING	82 TO 85	51	29.99	10	84.0	
0805150005WX	HAZY	78 TO 81	51	29.99	9	STRATUS CLOUDING	82 TO 85	51	29.99	10	86.5	
0805153506WX	HAZY	78 TO 81	51	29.99	9	STRATUS CLOUDING	82 TO 85	51	29.99	10	91.5	
0805171507WX	HAZY	78 TO 81	51	29.99	9	STRATUS CLOUDING	82 TO 85	51	29.99	10	87.3	
0805174008WX	HAZY	78 TO 81	51	29.99	9	STRATUS CLOUDING	82 TO 85	51	29.99	10	86.8	
0805181009WX	HAZY	78 TO 81	51	29.99	9	STRATUS CLOUDING	82 TO 85	51	29.99	10	88.7	
0806123001WX	HAZY	78 TO 81	77	30. 2	15	HAZY	74 TO 77	58	29.39	10	73.5	
0806130002WX	HAZY	78 TO 81	77	30. 2	15	HAZY	74 TO 77	58	29.39	10	76.9	
0806135004WX	HAZY	78 TO 81	77	30. 2	15	HAZY	74 TO 77	58	29.39	10	79.7	
0806160006WX	HAZY	82 TO 85	60	29.90	13	HAZY	78 TO 81	56	29.36	13	82.8	
0806162507WX	HAZY	82 TO 85	60	29.90	13	HAZY	78 TO 81	56	29.36	13	81.6	
0806165008WX	HAZY	82 TO 85	60	29.99	13	HAZY	78 TO 81	56	29.36	13	81.0	
0807093001WX	HAZY	74 TO 77	76	29.42	25	HAZY	70 TO 73	77	29.34	17	90.8	
0807095502WX	HAZY	74 TO 77	76	29.42	25	HAZY	70 TO 73	77	29.34	17	89.1	
0807101503WX	HAZY	74 TO 77	76	29.42	25	HAZY	70 TO 73	77	29.34	17	84.1	
0807104004WX	HAZY	74 TO 77	76	29.42	25	HAZY	70 TO 73	77	29.34	17	81.7	
0807153005WX	HAZY	86 TO 88	44	29.88	34	HEAVY HAZE	82 TO 85	47	29.23	22	87.0	
0807160006WX	HAZY	86 TO 88	44	29.88	34	HEAVY HAZE	82 TO 85	47	29.23	22	81.3	
0807163007WX	HAZY	86 TO 88	44	29.88	34	HEAVY HAZE	82 TO 85	47	29.23	22	78.5	
0807184008WX	HAZY	82 TO 85	44	29.88	34	HAZY	82 TO 85	47	29.23	22	79.4	
0807185509WX	HAZY	82 TO 85	57	29.84	25	HAZY	82 TO 85	49	29.80	19	79.7	
0807191010WX	HAZY	82 TO 85	57	29.84	25	HAZY	82 TO 85	49	29.80	19	80.4	
0807192611WX	HAZY	82 TO 85	57	29.84	25	HAZY	82 TO 85	49	29.80	19	80.7	
0807203012WX	HAZY	82 TO 85	57	29.84	25	HAZY	82 TO 85	49	29.80	19	87.8	
0807205013WX	HAZY	82 TO 85	57	29.84	25	HAZY	82 TO 85	49	29.80	19	89.1	
0807211715WX	HAZY	82 TO 85	57	29.84	25	HAZY	82 TO 85	49	29.83	19	83.3	
0807215017WX	HAZY	82 TO 85	57	29.84	25	HAZY	82 TO 85	49	29.80	19	83.0	
0811200005WX	RAIN, CUM CLOUD	74 TO 77	47	29.44	7	RAIN, CUM CLOUD	78 TO 81	47	29.97	7	77.0	
0811202006WX	RAIN, CUM CLOUD	74 TO 77	47	29.44	7	RAIN, CUM CLOUD	78 TO 81	47	29.97	7	74.9	
0811203507WX	RAIN, CUM CLOUD	74 TO 77	47	29.44	7	RAIN, CUM CLOUD	78 TO 81	47	29.97	7	60.2	
0811205508WX	RAIN, CUM CLOUD	74 TO 77	47	29.44	7	RAIN, CUM CLOUD	78 TO 81	47	29.97	7	55.4	
0811223009WX	RAIN, CUM CLOUD	74 TO 77	47	29.44	7	RAIN, CUM CLOUD	78 TO 81	47	29.97	7	78.7	
0811224510WX	RAIN, CUM CLOUD	74 TO 77	47	29.44	7	RAIN, CUM CLOUD	78 TO 81	47	29.97	7	75.5	
0811230011WX	RAIN, CUM CLOUD	74 TO 77	47	29.44	7	RAIN, CUM CLOUD	78 TO 81	47	29.97	7	69.3	
0811231512WX	RAIN, CUM CLOUD	74 TO 77	47	29.44	7	RAIN, CUM CLOUD	78 TO 81	47	29.97	7	81.0	
0812113001WX	RAIN, CUM CLOUD	74 TO 77	47	29.44	7	RAIN, CUM CLOUD	78 TO 81	47	29.97	7	74.1	
0812114502WX	RAIN, CUM CLOUD	74 TO 77	47	29.44	7	RAIN, CUM CLOUD	78 TO 81	47	29.97	7	73.4	
0812120003WX	RAIN, CUM CLOUD	74 TO 77	47	29.44	7	RAIN, CUM CLOUD	78 TO 81	47	29.97	7	71.9	
0812121504WX	RAIN, CUM CLOUD	74 TO 77	47	29.44	7	RAIN, CUM CLOUD	78 TO 81	47	29.97	7	68.7	
0812141005WX	RAIN, CUM CLOUD	74 TO 77	47	29.44	7	RAIN, CUM CLOUD	78 TO 81	47	29.97	7	77.2	
0812142506WX	RAIN, CUM CLOUD	74 TO 77	47	29.44	7	RAIN, CUM CLOUD	78 TO 81	47	29.97	7	77.4	
0812144007WX	RAIN, CUM CLOUD	74 TO 77	47	29.44	7	RAIN, CUM CLOUD	78 TO 81	47	29.97	7	78.2	
0812150608WX	RAIN, CUM CLOUD	74 TO 77	47	29.44	7	RAIN, CUM CLOUD	78 TO 81	47	29.97	7	76.2	
0812152509WX	RAIN, CUM CLOUD	74 TO 77	47	29.44	7	RAIN, CUM CLOUD	78 TO 81	47	29.97	7	72.8	
0812154010WX	RAIN, CUM CLOUD	74 TO 77	47	29.44	7	RAIN, CUM CLOUD	78 TO 81	47	29.97	7	74.2	

TEST	WEATHER	RECEIVE SITE TEMP DEGREES F.	REL HUM PERCENT	BARO PRES INCHES MERCURY	WIND SPEED KNOTS	WEATHER	TRANSMIT SITE TEMP DEGREES F.	REL HUM PERCENT	BARO PRES INCHES MERCURY	WIND SPEED KNOTS	SIGNAL STRG -DBM	CLOUD LEVEL FEET
0A13095001WX	CLEAR	70 TO 73	76	29.48	10	LIGHT FOG	70 TO 73	66	30.14	8	74.7	
0A13101002WX	CLEAR	70 TO 73	76	29.48	10	LIGHT FOG	70 TO 73	66	30.14	8	72.2	
0A13103003WX	CLEAR	70 TO 73	76	29.48	10	LIGHT FOG	70 TO 73	66	30.14	8	69.2	
0A13105004WX	CLEAR	70 TO 73	76	29.48	10	LIGHT FOG	70 TO 73	66	30.14	8	68.3	
0A13111505WX	CLEAR	74 TO 77	76	29.48	10	LIGHT FOG	70 TO 73	66	30.14	8	73.0	
0A13113006WX	CLEAR	74 TO 77	76	29.48	10	LIGHT HAZE	78 TO 81	66	30.14	8	75.6	
0A13114507WX	CLEAR	74 TO 77	68	30.14	10	LIGHT HAZE	78 TO 81	51	29.48	9	75.7	
0A13120008WX	CLEAR	74 TO 77	68	30.14	10	LIGHT HAZE	78 TO 81	51	29.48	39	75.4	
0A14150401WX	LIGHT HAZE	86 TO 88	36	29.48	15	LIGHT HAZE	86 TO 88	41	30. 4	15	76.0	
0A14152002WX	LIGHT HAZE	86 TO 88	36	29.48	15	LIGHT HAZE	86 TO 88	41	30. 4	15	77.6	
0A14154503WX	LIGHT HAZE	86 TO 88	36	29.48	15	LIGHT HAZE	86 TO 88	41	30. 4	15	77.5	
0A14155904WX	LIGHT HAZE	86 TO 88	36	29.48	15	LIGHT HAZE	86 TO 88	11	30. 4	15	79.3	
0A14155904WX	LIGHT HAZE	86 TO 88	36	29.48	15	LIGHT HAZE	86 TO 88	41	30. 4	15	79.3	
0A14161505WX	LIGHT HAZE	86 TO 88	36	29.48	15	LIGHT HAZE	86 TO 88	41	30. 4	15	79.3	
0A14164506WX	LIGHT HAZE	86 TO 88	36	29.48	15	LIGHT HAZE	86 TO 88	41	30. 4	15	80.6	
0A14170007WX	LIGHT HAZE	86 TO 88	36	29.48	15	LIGHT HAZE	86 TO 88	41	30. 4	15	81.9	
0A14171508WX	LIGHT HAZE	86 TO 88	36	29.48	15	LIGHT HAZE	86 TO 88	41	30. 4	15	82.6	
0A14175009WX	LIGHT HAZE	86 TO 88	36	29.48	15	LIGHT HAZE	86 TO 88	41	30. 4	15	82.4	
0A14181010WX	LIGHT HAZE	86 TO 88	36	29.48	15	LIGHT HAZE	86 TO 88	41	30. 4	15	84.0	
0A14182511WX	LIGHT HAZE	86 TO 88	36	29.48	15	LIGHT HAZE	86 TO 88	41	30. 4	15	83.9	
0A14193012WX	LIGHT HAZE	86 TO 88	45	30. 4	19	LIGHT HAZE	86 TO 88	43	30. 0	15	82.9	
0A14194513WX	LIGHT HAZE	86 TO 88	45	30. 4	19	LIGHT HAZE	86 TO 88	43	30. 0	15	78.8	
0A14200014WX	LIGHT HAZE	86 TO 88	45	30. 4	19	LIGHT HAZE	86 TO 88	43	30. 0	15	83.0	
0A14201515WX	LIGHT HAZE	86 TO 88	45	30. 4	19	LIGHT HAZE	86 TO 88	43	30. 0	15	84.2	
0A14203016WX	LIGHT HAZE	86 TO 88	45	30. 4	19	LIGHT HAZE	86 TO 88	43	30. 0	15	83.0	
0A14211517WX	LIGHT HAZE	70 TO 73	68	30. 7	15	CUMULUS CLOUDING	78 TO 81	46	30. 5	15	86.8	
0A14214518WX	LIGHT HAZE	70 TO 73	68	30. 7	15	CUMULUS CLOUDING	78 TO 81	46	30. 5	15	83.2	
0A14221019WX	LIGHT HAZE	70 TO 73	68	30. 7	15	CUMULUS CLOUDING	78 TO 81	46	30. 5	15	84.3	
0A14222720WX	LIGHT HAZE	70 TO 73	68	30. 7	15	CUMULUS CLOUDING	78 TO 81	46	30. 5	15	89.5	
0A19180509NX	CLEAR	74 TO 77	47	29.86	16	CLEAR	78 TO 81	40	29.21	16	87.7	
0A19182510NX	CLEAR	74 TO 77	47	29.86	16	CLEAR	78 TO 81	40	29.21	16	88.9	
0A19184011NX	CLEAR	74 TO 77	47	29.86	16	CLEAR	78 TO 81	40	29.21	16	89.3	
0A19190012NX	CLEAR	74 TO 77	45	29.84	20	CLEAR	76 TO 81	79	29.84	14	88.9	
0A19203014NX	CLEAR	70 TO 73	45	29.84	20	CLEAR	70 TO 73	79	29.84	14	90.5	
0A19204515NX	CLEAR	70 TO 73	45	29.84	20	CLEAR	70 TO 73	79	29.84	14	89.4	
0A19210016NX	CLEAR	70 TO 73	45	29.86	20	CLEAR	70 TO 73	79	29.84	14	88.7	
0A20100001WX	CLEAR	62 TO 65	56	30. 7	17	CLEAR	62 TO 65	36	29.87	17	75.7	
0A20102502WX	CLEAR	62 TO 65	56	30. 7	17	CLEAR	62 TO 65	36	29.87	17	75.9	
0A20104503WX	CLEAR	62 TO 65	56	30. 7	17	CLEAR	62 TO 65	36	29.87	17	77.6	
0A20110004WX	CLEAR	62 TO 65	56	30. 7	17	CLEAR	62 TO 65	36	29.87	17	77.5	
0A20120005WX	CLEAR	62 TO 65	56	30. 7	17	CLEAR	62 TO 65	36	29.87	17	72.0	
0A20122006WX	CLEAR	62 TO 65	56	30. 7	17	CLEAR	62 TO 65	36	29.87	17	69.8	
0A20123507WX	CLEAR	62 TO 65	56	30. 7	17	CLEAR	62 TO 65	36	29.87	17	70.5	
0A20125508WX	CLEAR	62 TO 65	56	30. 7	17	CLEAR	62 TO 65	36	29.87	17	69.9	

TEST RECORD
ONTARIO CENTER, SUMMER

C-BAND

TEST	WEATHER	RECEIVE SITE TEMP DEGREES F.	RECEIVE SITE REL HUM PERCENT	RECEIVE SITE BARO PRES INCHES MERCURY	RECEIVE SITE WIND SPEED KNOTS	WEATHER	TRANSMIT SITE TEMP DEGREES F.	TRANSMIT SITE REL HUM PERCENT	TRANSMIT SITE BARO PRES INCHES MERCURY	TRANSMIT SITE WIND SPEED KNOTS	SIGNAL STRG -DBM	CLOUD LEVEL FEET
0805144004WC	HAZY	78 TO 81	51	29.99	9	STRATUS CLOUDING	82 TO 85	51	29.99	10	77.2	
0805150005WC	HAZY	78 TO 81	51	29.99	9	STRATUS CLOUDING	82 TO 85	51	29.99	10	77.4	
0805153506WC	HAZY	78 TO 81	51	29.99	9	STRATUS CLOUDING	82 TO 85	51	29.99	10	75.9	
0805171507WC	HAZY	78 TO 81	51	29.99	9	STRATUS CLOUDING	82 TO 85	51	29.99	10	77.1	
0805174008WC	HAZY	78 TO 81	51	29.99	9	STRATUS CLOUDING	82 TO 85	51	29.99	10	77.6	
0805181009WC	HAZY	78 TO 81	51	29.90	9	STRATUS CLOUDING	82 TO 85	51	29.99	10	79.8	
0806123001WC	HAZY	78 TO 81	77	30. 2	15	HAZY	74 TO 77	58	29.39	10	72.9	
0806130002WC	HAZY	78 TO 81	77	30. 2	15	HAZY	74 TO 77	58	29.39	10	74.5	
0806132503WC	HAZY	78 TO 81	77	30. 2	15	HAZY	74 TO 77	58	29.39	10	75.4	
0806135004WC	HAZY	78 TO 81	77	30. 2	15	HAZY	74 TO 77	58	29.39	10	75.2	
0806160006WC	HAZY	82 TO 85	60	29.90	13	HAZY	78 TO 81	56	29.36	13	79.1	
0806162507WC	HAZY	82 TO 85	60	29.99	13	HAZY	78 TO 81	56	29.36	13	79.1	
0806165008WC	HAZY	82 TO 85	60	29.99	13	HAZY	78 TO 81	56	29.36	13	77.5	
0807153005WC	HAZY	86 TO 88	44	29.89	34	HEAVY HAZE	82 TO 85	47	29.23	22	78.3	
0811174501WC	CUMULUS CLOUDING	74 TO 77	47	29.44	7	CUMULUS CLOUDING	74 TO 77	46	29.97	7	80.2	
0811180502WC	CUMULUS CLOUDING	74 TO 77	47	29.44	7	CUMULUS CLOUDING	74 TO 77	47	29.97	7	81.9	
0811182503WC	CUMULUS CLOUDING	74 TO 77	47	29.44	7	CUMULUS CLOUDING	74 TO 77	47	29.97	7	82.1	
0811184004WC	CUMULUS CLOUDING	74 TO 77	47	29.44	7	CUMULUS CLOUDING	74 TO 77	47	29.97	7	79.4	
0811200005WC	CUMULUS CLOUDING	74 TO 77	47	29.44	7	CUMULUS CLOUDING	78 TO 81	47	29.97	7	76.7	
0811223009WC	CUMULUS CLOUDING	74 TO 77	47	29.44	7	CUMULUS CLOUDING	78 TO 81	47	29.97	7	75.4	
0811224510WC	CUMULUS CLOUDING	74 TO 77	47	29.44	7	CUMULUS CLOUDING	78 TO 81	47	29.97	7	77.4	
0811230011WC	CUMULUS CLOUDING	74 TO 77	47	29.44	7	CUMULUS CLOUDING	78 TO 81	47	29.97	7	66.1	
0812114502WC	CUMULUS CLOUDING	74 TO 77	47	29.44	7	CUMULUS CLOUDING	78 TO 81	47	29.97	7	71.2	
0812121504WC	CUMULUS CLOUDING	74 TO 77	47	29.44	7	CUMULUS CLOUDING	78 TO 81	47	29.97	7	69.0	
0812154010WC	CUMULUS CLOUDING	74 TO 77	47	29.44	7	CUMULUS CLOUDING	78 TO 81	47	29.97	7	70.8	
0813095001WC	CLEAR	70 TO 73	76	29.48	10	LIGHT FOG	70 TO 73	66	30.14	8	71.5	
0813101002WC	CLEAR	70 TO 73	76	29.48	10	LIGHT FOG	70 TO 73	66	30.14	8	67.8	
0813103003WC	CLEAR	70 TO 73	76	29.48	10	LIGHT FOG	70 TO 73	66	30.14	8	66.4	
0813105004WC	CLEAR	70 TO 73	76	29.48	10	LIGHT FOG	70 TO 73	66	30.14	8	66.7	
0813111505WC	CLEAR	74 TO 77	76	29.49	10	LIGHT FOG	70 TO 73	66	30.14	8	71.5	
0813113006WC	CLEAR	74 TO 77	76	29.48	10	HAZY	78 TO 81	66	30.14	8	72.3	
0813114507WC	CLEAR	74 TO 77	68	30.14	10	HAZY	78 TO 81	51	29.48	9	66.2	
0813120008WC	CLEAR	74 TO 77	68	30.14	10	HAZY	78 TO 81	51	29.48	9	71.3	
0819135503WC	CLEAR	74 TO 77	47	29.85	16	CLEAR	78 TO 81	46	29.21	16	72.8	
0819145505WC	CLEAR	74 TO 77	47	29.85	16	CLEAR	78 TO 81	46	29.21	16	74.9	
0819151506WC	CLEAR	74 TO 77	47	29.85	16	CLEAR	78 TO 81	46	29.21	16	75.8	
0819154007WC	CLEAR	74 TO 77	47	29.85	16	CLEAR	78 TO 81	46	29.21	16	77.9	
0819155508WC	CLEAR	74 TO 77	47	29.85	16	CLEAR	78 TO 81	46	29.21	16	78.3	
0819180509WC	CLEAR	74 TO 77	47	29.86	20	CLEAR	78 TO 81	46	29.21	16	82.0	
0819182510WC	CLEAR	74 TO 77	47	29.86	20	CLEAR	78 TO 81	46	29.21	16	82.5	
0819184011WC	CLEAR	74 TO 77	47	29.86	20	CLEAR	78 TO 81	46	29.21	16	81.9	
0819190012WC	CLEAR	74 TO 77	45	29.86	20	CLEAR	78 TO 81	79	29.84	14	81.4	
0819201513WC	CLEAR	70 TO 73	45	29.86	20	CLEAR	70 TO 73	79	29.84	14	82.0	
0819203014WC	CLEAR	70 TO 73	45	29.86	20	CLEAR	70 TO 73	79	29.84	14	82.5	
0819204515WC	CLEAR	70 TO 73	45	29.86	20	CLEAR	70 TO 73	79	29.84	14	82.7	
0819210016WC	CLEAR	70 TO 73	45	29.96	20	CLEAR	70 TO 73	79	29.84	14	83.4	

TEST RECORD
WHITFORD FIELD, SUMMER

X-BAND

TEST	WEATHER	RECEIVE SITE TEMP DEGREES F.	REL HUM PERCENT	BARO PRES INCHES MERCURY	WIND SPEED KNOTS	WEATHER	TRANSMIT SITE TEMP DEGREES F.	REL HUM PERCENT	BARO PRES INCHES MERCURY	WIND SPEED KNOTS	SIGNAL STRG -DBM	CLOUD LEVEL FEET
0828165501WX	CLEAR	86 TO 88	36	30.21	10	CLEAR	86 TO 88	53	29.52	17	94.1	
0828172502WX	CLEAR	86 TO 88	36	30.21	10	CLEAR	86 TO 88	53	29.52	17	100.9	
0828174503WX	CLEAR	86 TO 88	36	30.21	10	CLEAR	86 TO 88	53	29.52	17	105.5	
0828182004WX	CLEAR	86 TO 88	36	30.21	10	CLEAR	86 TO 88	53	29.52	17	103.9	
0828184005WX	LIGHT HAZE	82 TO 85	42	30.17	27	LIGHT HAZE	82 TO 85	41	30.12	27	106.1	
0828194006NX	LIGHT HAZE	82 TO 85	42	30.17	27	LIGHT HAZE	82 TO 85	41	30.12	27	120.5	
0828195507NX	LIGHT HAZE	82 TO 85	42	30.17	27	LIGHT HAZE	82 TO 85	41	30.12	27	120.2	
0829083801NX	LIGHT HAZE	70 TO 73	68	30.19	15	LIGHT HAZE	74 TO 77	77	29.52	14	114.3	
0829085002NX	LIGHT HAZE	70 TO 73	68	30.19	15	LIGHT HAZE	74 TO 77	77	29.52	14	115.4	
0829090703NX	LIGHT HAZE	70 TO 73	68	30.19	15	LIGHT HAZE	74 TO 77	77	29.52	14	116.7	
0829092504NX	LIGHT HAZE	70 TO 73	68	30.19	15	LIGHT HAZE	74 TO 77	77	29.52	14	117.0	
0829094005NX	LIGHT HAZE	70 TO 73	68	30.19	15	LIGHT HAZE	74 TO 77	77	29.52	14	118.4	
0829102806NX	LIGHT HAZE	74 TO 77	57	30.18	15	LIGHT HAZE	78 TO 81	72	29.52	14	116.5	
0829111008NX	LIGHT HAZE	74 TO 77	57	30.18	15	LIGHT HAZE	78 TO 81	72	29.52	14	116.7	
0829120809WX	LIGHT HAZE	74 TO 77	57	30.18	15	LIGHT HAZE	78 TO 81	72	29.52	14	100.5	
0829123010WX	LIGHT HAZE	74 TO 77	57	30.18	15	LIGHT HAZE	78 TO 81	72	29.52	14	97.1	
0829125811WX	LIGHT HAZE	82 TO 85	57	30.18	15	LIGHT HAZE	82 TO 85	72	29.52	14	98.7	
0829131512WX	LIGHT HAZE	82 TO 85	43	30.18	14	LIGHT HAZE	82 TO 85	61	29.52	14	100.9	
0829133513WX	LIGHT HAZE	82 TO 85	43	30.18	14	LIGHT HAZE	82 TO 85	61	29.52	14	102.3	
0829145014WX	LIGHT HAZE	86 TO 88	44	30.17	10	LIGHT HAZE	82 TO 85	55	29.49	11	92.7	
0829150815WX	LIGHT HAZE	86 TO 88	44	30.17	10	LIGHT HAZE	82 TO 85	55	29.49	11	94.4	
0829152016WX	LIGHT HAZE	86 TO 88	44	30.17	10	LIGHT HAZE	82 TO 85	55	29.49	11	92.6	
0829153817WX	LIGHT HAZE	86 TO 88	44	30.17	10	LIGHT HAZE	82 TO 85	55	29.49	11	90.7	
0829155018WX	LIGHT HAZE	86 TO 88	44	30.17	10	LIGHT HAZE	82 TO 85	55	29.49	11	92.8	
0905114501NX	LIGHT HAZE	74 TO 77	62	30.19	10	LIGHT HAZE	82 TO 85	63	29.46	14	118.8	
0905120102NX	LIGHT HAZE	74 TO 77	62	30.19	10	LIGHT HAZE	82 TO 85	63	29.46	14	117.3	
0905121703NX	LIGHT HAZE	74 TO 77	62	30.19	10	LIGHT HAZE	82 TO 85	63	29.46	14	116.9	
0905134004NX	LIGHT HAZE	74 TO 77	62	30.19	10	LIGHT HAZE	82 TO 85	63	29.46	14	106.7	
0905135505NX	LIGHT HAZE	74 TO 77	57	30.14	21	LIGHT HAZE	82 TO 85	67	29.44	15	107.8	
0905141006NX	CUMULUS CLOUDING	78 TO 81	57	30.14	21	LIGHT HAZE	82 TO 85	67	29.44	15	105.1	
0905144508NX	CUMULUS CLOUDING	78 TO 81	57	30.14	21	LIGHT HAZE	82 TO 85	67	29.44	15	107.2	
0905153509NX	CUMULUS CLOUDING	78 TO 81	57	30.14	21	LIGHT HAZE	82 TO 85	67	29.44	15	110.1	
0905155510NX	CUMULUS CLOUDING	78 TO 81	57	30.14	21	LIGHT HAZE	82 TO 85	67	29.44	15	106.9	
0905161011NX	CUMULUS CLOUDING	78 TO 81	57	30.14	21	LIGHT HAZE	82 TO 85	67	29.44	15	114.6	
0905163012NX	CUMULUS CLOUDING	78 TO 81	57	30.14	21	LIGHT HAZE	82 TO 85	67	29.44	15	117.3	
0908105501WX	CUMULUS CLOUDING	66 TO 69	67	29.20	15	CLEAR	66 TO 69	68	29.27	13	103.1	
0908112503WX	CUMULUS CLOUDING	66 TO 69	67	29.20	15	CLEAR	66 TO 69	68	29.27	13	104.2	
0908131505WX	CUMULUS CLOUDING	66 TO 69	73	29. 9	7	CLEAR	66 TO 69	73	29.92	12	98.5	
0908141008WX	CUMULUS CLOUDING	66 TO 69	73	29. 9	7	CLEAR	66 TO 69	73	29.92	12	94.5	
0908171511WX	CUMULUS CLOUDING	74 TO 77	46	29.84	11	CLEAR	74 TO 77	53	29.86	14	102.9	
0908175013WX	CUMULUS CLOUDING	74 TO 77	46	29.84	11	CLEAR	74 TO 77	53	29.86	14	100.0	
0908194017WX	CUMULUS CLOUDING	74 TO 77	46	29.84	11	CLEAR	74 TO 77	53	29.86	14	96.5	

TEST RECORD
WHITFORD FIELD, SUMMER

C-BAND

TEST	WEATHER	RECEIVE SITE TEMP DEGREES F.	REL HUM PERCENT	BARO PRES INCHES MERCURY	WIND SPEED KNOTS	WEATHER	TRANSMIT SITE TEMP DEGREES F.	REL HUM PERCENT	BARO PRES INCHES MERCURY	WIND SPEED KNOTS	SIGNAL STRG -DBM	CLOUD LEVEL FEET
0828165501NC	CLEAR	86 TO 88	36	30.21	10	CLEAR	86 TO 88	53	29.52	17	109.8	
0828172502NC	CLEAR	86 TO 88	36	30.21	10	CLEAR	86 TO 88	53	29.52	17	112.7	
0828174503NC	CLEAR	86 TO 88	36	30.21	10	CLEAR	86 TO 88	53	29.52	17	116.8	
0828182004NC	CLEAR	86 TO 88	36	30.21	10	CLEAR	86 TO 88	53	29.52	17	117.7	
0828184005NC	LIGHT HAZE	82 TO 85	42	30.17	27	LIGHT HAZE	82 TO 85	41	30.12	27	118.3	
0828194006WC	LIGHT HAZE	82 TO 85	42	30.17	27	LIGHT HAZE	82 TO 85	41	30.12	27	97.1	
0828195507WC	LIGHT HAZE	82 TO 85	42	30.17	27	LIGHT HAZE	82 TO 85	41	30.12	27	96.6	
0829083501WC	LIGHT HAZE	70 TO 73	68	30.19	15	LIGHT HAZE	74 TO 77	77	29.52	14	96.9	
0829085002WC	LIGHT HAZE	70 TO 73	68	30.19	15	LIGHT HAZE	74 TO 77	77	29.52	14	96.7	
0829090703WC	LIGHT HAZE	70 TO 73	68	30.19	15	LIGHT HAZE	74 TO 77	77	29.52	14	94.7	
0829092504WC	LIGHT HAZE	70 TO 73	68	30.19	15	LIGHT HAZE	74 TO 77	77	29.52	14	91.6	
0829094005WC	LIGHT HAZE	70 TO 73	68	30.19	15	LIGHT HAZE	74 TO 77	77	29.52	14	90.4	
0829102506WC	LIGHT HAZE	74 TO 77	57	30.18	15	LIGHT HAZE	78 TO 81	72	29.52	14	94.2	
0829105007WC	LIGHT HAZE	74 TO 77	57	30.18	15	LIGHT HAZE	78 TO 81	72	29.52	14	93.4	
0829111008WC	LIGHT HAZE	74 TO 77	57	30.18	15	LIGHT HAZE	78 TO 81	72	29.52	14	93.4	
0829120509NC	LIGHT HAZE	74 TO 77	57	30.18	15	LIGHT HAZE	78 TO 81	72	29.52	14	115.3	
0829123010NC	LIGHT HAZE	74 TO 77	57	30.18	15	LIGHT HAZE	78 TO 81	72	29.52	14	115.0	
0829125511NC	LIGHT HAZE	82 TO 85	43	30.18	14	LIGHT HAZE	82 TO 85	61	29.52	14	114.1	
0829131512NC	LIGHT HAZE	82 TO 85	43	30.18	14	LIGHT HAZE	82 TO 85	61	29.52	14	117.5	
0829133513NC	LIGHT HAZE	82 TO 85	43	30.18	14	LIGHT HAZE	82 TO 85	61	29.52	14	115.7	
0829145014WC	LIGHT HAZE	86 TO 88	44	30.17	10	LIGHT HAZE	82 TO 85	55	29.49	11	85.0	
0829150515WC	LIGHT HAZE	86 TO 88	44	30.17	10	LIGHT HAZE	82 TO 85	55	29.49	11	85.4	
0829152016WC	LIGHT HAZE	86 TO 88	44	30.17	10	LIGHT HAZE	82 TO 85	55	29.49	11	84.6	
0829153517WC	LIGHT HAZE	86 TO 88	44	30.17	10	LIGHT HAZE	78 TO 81	55	29.49	11	82.2	
0829155018WC	LIGHT HAZE	86 TO 88	44	30.17	10	LIGHT HAZE	78 TO 81	55	29.49	11	84.2	
0902103002WC	STRATUS CLOUDING	70 TO 73	76	30.19	5	STRATUS CLOUDING	70 TO 73	82	29.50	5	91.2	
0902104003WC	STRATUS CLOUDING	70 TO 73	76	30.19	5	STRATUS CLOUDING	70 TO 73	82	29.50	5	92.4	
0902105504WC	STRATUS CLOUDING	70 TO 73	76	30.19	5	STRATUS CLOUDING	70 TO 73	82	29.50	5	92.4	
0902111005WC	STRATUS CLOUDING	70 TO 73	76	30.19	5	STRATUS CLOUDING	70 TO 73	82	29.50	5	95.3	
0902112506WC	STRATUS CLOUDING	70 TO 73	76	30.19	5	STRATUS CLOUDING	70 TO 73	82	29.50	5	94.6	
0902122007WC	STRATUS CLOUDING	70 TO 73	76	30.19	5	STRATUS CLOUDING	70 TO 73	82	29.50	5	94.6	
0902124008WC	STRATUS CLOUDING	70 TO 73	71	30.20	5	STRATUS CLOUDING	70 TO 73	76	29.51	5	95.4	
0902131009WC	STRATUS CLOUDING	70 TO 73	71	30.20	5	STRATUS CLOUDING	70 TO 73	76	29.51	5	95.2	
0902134510WC	STRATUS CLOUDING	70 TO 73	71	30.20	5	STRATUS CLOUDING	70 TO 73	76	29.51	5	92.2	
0902140011WC	STRATUS CLOUDING	70 TO 73	71	30.20	5	STRATUS CLOUDING	70 TO 73	76	29.51	5	89.6	
0902141512WC	STRATUS CLOUDING	70 TO 73	71	30.20	5	STRATUS CLOUDING	70 TO 73	76	29.51	5	90.0	
0902143513WC	STRATUS CLOUDING	70 TO 73	71	30.20	5	STRATUS CLOUDING	70 TO 73	76	29.51	5	94.8	
0902151014WC	STRATUS CLOUDING	70 TO 73	71	30.20	5	STRATUS CLOUDING	70 TO 73	76	29.51	5	89.3	
0902152515WC	STRATUS CLOUDING	70 TO 73	71	30.20	5	STRATUS CLOUDING	70 TO 73	76	29.51	5	92.5	
0902154516WC	STRATUS CLOUDING	70 TO 73	71	30.20	5	STRATUS CLOUDING	70 TO 73	76	29.51	5	93.8	
0902160117WC	STRATUS CLOUDING	70 TO 73	71	30.20	5	STRATUS CLOUDING	70 TO 73	76	29.51	5	93.0	
0903133008NC	CLEAR	78 TO 81	50	30.19	3	CLEAR	78 TO 81	53	29.52	5	112.9	
0903142009NC	CLEAR	78 TO 81	50	30.19	3	CLEAR	78 TO 81	53	29.52	5	110.7	
0903143510NC	CLEAR	78 TO 81	50	30.19	3	CLEAR	78 TO 81	53	29.52	5	109.9	
0903145511NC	CLEAR	78 TO 81	50	30.19	3	CLEAR	78 TO 81	53	29.52	5	107.4	
0903151012NC	CLEAR	78 TO 81	50	30.19	3	CLEAR	78 TO 81	53	29.52	5	109.8	
0904151503NC	STRATUS CLOUDING	78 TO 81	54	30.21	7	STRATUS CLOUDING	82 TO 85	57	29.54	9	106.6	

TEST	RECEIVE SITE WEATHER	RECEIVE SITE TEMP DEGREES F.	RECEIVE SITE REL HUM PERCENT	RECEIVE SITE BARO PRES INCHES MERCURY	RECEIVE SITE WIND SPEED KNOTS	TRANSMIT SITE WEATHER	TRANSMIT SITE TEMP DEGREES F.	TRANSMIT SITE REL HUM PERCENT	TRANSMIT SITE BARO PRES INCHES MERCURY	TRANSMIT SITE WIND SPEED KNOTS	SIGNAL STRG -DBM	CLOUD LEVEL FEET
0904153004NC	STRATUS CLOUDING	78 TO 81	54	30.21	7	STRATUS CLOUDING	82 TO 85	57	29.54	9	111.6	
0904155005NC	STRATUS CLOUDING	78 TO 81	54	30.21	7	STRATUS CLOUDING	82 TO 85	57	29.54	9	113.0	
0904160006NC	STRATUS CLOUDING	78 TO 81	54	30.21	7	STRATUS CLOUDING	82 TO 85	57	29.54	9	110.8	
0904161707NC	STRATUS CLOUDING	78 TO 81	54	30.21	7	STRATUS CLOUDING	82 TO 85	57	29.54	9	114.4	
0905114501WC	LIGHT HAZE	74 TO 77	62	30.19	10	LIGHT HAZE	82 TO 85	63	29.46	14	97.6	
0905120102WC	LIGHT HAZE	74 TO 77	62	30.19	10	LIGHT HAZE	82 TO 85	63	29.46	14	96.3	
0905121703WC	LIGHT HAZE	74 TO 77	62	30.19	10	LIGHT HAZE	82 TO 85	63	29.46	14	95.0	
0905134004WC	LIGHT HAZE	74 TO 77	62	30.19	10	LIGHT HAZE	82 TO 85	63	29.46	14	89.5	
0905135505WC	LIGHT HAZE	74 TO 77	62	30.19	10	LIGHT HAZE	82 TO 85	63	29.46	14	88.9	
0905141006WC	CUMULUS CLOUDING	78 TO 81	57	30.14	21	LIGHT HAZE	82 TO 85	67	29.44	15	86.3	
0905142507WC	CUMULUS CLOUDING	78 TO 81	57	30.14	21	LIGHT HAZE	82 TO 85	67	29.44	15	85.8	
0905144508WC	CUMULUS CLOUDING	78 TO 81	57	30.14	21	LIGHT HAZE	82 TO 85	67	29.44	15	87.9	
0905153509WC	CUMULUS CLOUDING	78 TO 81	57	30.14	21	LIGHT HAZE	82 TO 85	67	29.44	15	92.6	
0905155510WC	CUMULUS CLOUDING	78 TO 81	57	30.14	21	LIGHT HAZE	82 TO 85	67	29.44	15	90.2	
0905163012WC	CUMULUS CLOUDING	78 TO 81	57	30.14	21	LIGHT HAZE	82 TO 85	67	29.44	15	97.3	
0908105501WC	CUMULUS CLOUDING	66 TO 69	67	29.29	15	CLEAR	66 TO 69	68	29.27	13	94.0	
0908111002WC	CUMULUS CLOUDING	66 TO 69	67	29.29	15	CLEAR	66 TO 69	68	29.27	13	98.1	
0908112503WC	CUMULUS CLOUDING	66 TO 69	67	29.29	15	CLEAR	66 TO 69	68	29.27	13	100.9	
0908114004WC	CUMULUS CLOUDING	66 TO 69	67	29.29	15	CLEAR	66 TO 69	68	29.27	13	100.2	
0908131505WC	CUMULUS CLOUDING	66 TO 69	73	29. 8	7	CLEAR	66 TO 69	73	29.92	12	95.7	
0908134006WC	CUMULUS CLOUDING	66 TO 69	73	29. 8	7	CLEAR	66 TO 69	73	29.92	12	92.6	
0908135507WC	CUMULUS CLOUDING	66 TO 69	73	29. 8	7	CLEAR	66 TO 69	73	29.92	12	91.9	
0908141008WC	CUMULUS CLOUDING	66 TO 69	73	29. 8	7	CLEAR	66 TO 69	73	29.92	12	91.4	
0908150009WC	CUMULUS CLOUDING	66 TO 69	73	29. 8	7	CLEAR	66 TO 69	73	29.92	12	93.3	
0908151510WC	CUMULUS CLOUDING	66 TO 69	73	29. 8	7	CLEAR	66 TO 69	73	29.92	12	99.8	
0908171511NC	CUMULUS CLOUDING	74 TO 77	46	29.84	11	CLEAR	74 TO 77	53	29.86	14	118.7	
0908173012NC	CUMULUS CLOUDING	74 TO 77	46	29.84	11	CLEAR	74 TO 77	53	29.86	14	121.0	
0908175013NC	CUMULUS CLOUDING	74 TO 77	46	29.84	11	CLEAR	74 TO 77	53	29.86	14	120.5	
0908180214WC	CUMULUS CLOUDING	74 TO 77	46	29.84	11	CLEAR	74 TO 77	53	29.86	14	100.3	
0908181815NC	CUMULUS CLOUDING	74 TO 77	46	29.84	11	CLEAR	74 TO 77	53	29.86	14	117.8	
0908183216WC	CUMULUS CLOUDING	74 TO 77	46	29.84	11	CLEAR	74 TO 77	53	29.86	14	96.5	
0908200018WC	CUMULUS CLOUDING	74 TO 77	42	29.84	10	CLEAR	74 TO 77	53	29.86	14	98.3	
0908201519NC	CUMULUS CLOUDING	74 TO 77	42	29.84	10	CLEAR	74 TO 77	53	29.86	14	114.2	
0909095001NC	CLEAR	62 TO 65	62	29.83	15	CUMULUS CLOUDING	62 TO 65	63	29.21	14	114.5	
0909100802WC	CLEAR	62 TO 65	62	29.83	15	CUMULUS CLOUDING	62 TO 65	63	29.21	14	106.4	
0909103003NC	CLEAR	62 TO 65	62	29.83	15	CUMULUS CLOUDING	62 TO 65	63	29.21	14	119.7	
0909105004WC	CLEAR	62 TO 65	62	29.83	15	CUMULUS CLOUDING	62 TO 65	63	29.21	14	100.4	

TEST RECORD
POINT PETRE, SEPTEMBER

X-HAND

TEST	RECEIVE SITE WEATHER	RECEIVE SITE TEMP DEGREES F.	RECEIVE SITE REL HUM PERCENT	RECEIVE SITE BARO PRES INCHES MERCURY	RECEIVE SITE WIND SPEED KNOTS	TRANSMIT SITE WEATHER	TRANSMIT SITE TEMP DEGREES F.	TRANSMIT SITE REL HUM PERCENT	TRANSMIT SITE BARO PRES INCHES MERCURY	TRANSMIT SITE WIND SPEED KNOTS	SIGNAL STRG -DBM	CLOUD LEVEL FEET
0915203001WX	DARK	66 TO 69	76	29.92	30	DARK	66 TO 69	79	29.92	30	89.2	
0915211003WX	DARK	66 TO 69	76	29.92	30	DARK	66 TO 69	79	29.92	30	87.8	
0915212604WX	DARK	66 TO 69	76	29.93	30	DARK	66 TO 69	79	29.92	30	87.3	
0916110001WX	STRATUS CLOUDING	66 TO 69	85	29.91	25	RAIN, STAT CLOUD	70 TO 73	59	29.95	20	88.3	
0916151509WX	STRATUS CLOUDING	66 TO 69	85	29.91	25	STRATUS CLOUDING	78 TO 81	65	29.96	23	87.7	
0916153510WX	STRATUS CLOUDING	70 TO 73	73	29.86	30	STRATUS CLOUDING	78 TO 81	65	29.92	20	86.7	
0916155511WX	STRATUS CLOUDING	70 TO 73	73	29.86	30	STRATUS CLOUDING	78 TO 81	65	29.92	20	84.9	
0916161012WX	STRATUS CLOUDING	70 TO 73	73	29.86	30	STRATUS CLOUDING	78 TO 81	65	29.92	20	84.3	
0917094501WX	RAIN, STAT CLOUD	54 TO 57	94	29.93	15	STRATUS CLOUDING	54 TO 57	94	29.93	15	89.9	
0917100502WX	RAIN, STAT CLOUD	54 TO 57	94	29.93	15	STRATUS CLOUDING	54 TO 57	94	29.93	15	89.7	
0917110203WX	STRATUS CLOUDING	50 TO 53	94	30. 1	15	STRATUS CLOUDING	54 TO 57	94	29.93	15	97.6	
0917112004WX	STRATUS CLOUDING	50 TO 53	94	30. 1	15	STRATUS CLOUDING	54 TO 57	94	29.93	15	97.4	
0917113505WX	STRATUS CLOUDING	50 TO 53	94	30. 1	15	STRATUS CLOUDING	54 TO 57	94	29.93	15	95.2	
0917115606WX	STRATUS CLOUDING	50 TO 53	94	30. 1	15	STRATUS CLOUDING	54 TO 57	94	29.93	15	78.4	
0917140407WX	STRATUS CLOUDING	54 TO 57	73	30. 3	15	STRATUS CLOUDING	54 TO 57	81	29.42	6	85.7	
0917151009WX	STRATUS CLOUDING	54 TO 57	73	30. 3	15	STRATUS CLOUDING	54 TO 57	81	29.42	6	89.3	
0917152510WX	STRATUS CLOUDING	54 TO 57	73	30. 3	15	STRATUS CLOUDING	54 TO 57	81	29.42	6	90.3	
0917160012WX	STRATUS CLOUDING	54 TO 57	66	30. 5	15	STRATUS CLOUDING	54 TO 57	83	29.42	6	88.5	
0918091501WX	CLEAR	50 TO 53	81	30.34	10	CUMULUS CLOUDING	50 TO 53	86	29.67	17	88.0	
0918093502WX	CLEAR	50 TO 53	81	30.34	10	CUMULUS CLOUDING	50 TO 53	86	29.67	17	86.5	
0918095003WX	CLEAR	50 TO 53	81	30.34	10	CUMULUS CLOUDING	50 TO 53	86	29.67	17	84.9	
0918100504WX	CLEAR	50 TO 53	81	30.34	10	CUMULUS CLOUDING	50 TO 53	86	29.67	17	83.9	
0918110005WX	CLEAR	50 TO 53	81	30.34	10	CUMULUS CLOUDING	50 TO 53	86	29.67	17	88.1	
0918111606WX	CLEAR	50 TO 53	81	30.34	10	CUMULUS CLOUDING	50 TO 53	86	29.67	17	91.5	
0918113507WX	CUMULUS CLOUDING	54 TO 57	69	30.36	15	CUMULUS CLOUDING	54 TO 57	53	29.70	17	94.2	
0918115408WX	CUMULUS CLOUDING	54 TO 57	69	30.36	15	CUMULUS CLOUDING	54 TO 57	53	29.70	17	93.6	
0918133209WX	CLEAR	58 TO 61	55	30.36	13	CLEAR	66 TO 69	48	29.71	17	90.7	
0918135010WX	CLEAR	58 TO 61	55	30.36	13	CLEAR	66 TO 69	48	29.71	17	90.7	
0918140611WX	CLEAR	58 TO 61	55	30.36	13	CLEAR	66 TO 69	48	29.71	17	89.2	
0918142512WX	CLEAR	58 TO 61	55	30.36	13	CLEAR	66 TO 69	48	29.71	17	93.5	
0918153013WX	CUMULUS CLOUDING	58 TO 61	52	30. 7	10	CLEAR	66 TO 69	45	29.71	17	98.0	
0918155014WX	CUMULUS CLOUDING	58 TO 61	52	30. 7	10	CLEAR	66 TO 69	45	29.71	17	95.2	
0918165015WX	CUMULUS CLOUDING	58 TO 61	52	30. 7	10	CLEAR	66 TO 69	45	29.71	17	112.7	
0918170516WX	CUMULUS CLOUDING	58 TO 61	52	30. 7	10	CLEAR	66 TO 69	45	29.71	17	112.3	
0918172017WX	CUMULUS CLOUDING	58 TO 61	52	30. 7	10	CLEAR	66 TO 69	45	29.71	17	112.3	
0918173518WX	CUMULUS CLOUDING	58 TO 61	52	30. 7	10	CLEAR	66 TO 69	45	29.71	17	110.9	
0918175519WX	CUMULUS CLOUDING	58 TO 61	52	30. 7	10	CLEAR	66 TO 69	45	29.71	17	11[illegible].6	
0918193021WX	CUMULUS CLOUDING	54 TO 57	49	30.11	20	CLEAR	62 TO 65	40	29.73	15	92.8	
0918194522WX	CUMULUS CLOUDING	54 TO 57	49	30.11	20	CLEAR	62 TO 65	40	29.73	15	92.8	
0918205023WX	CUMULUS CLOUDING	54 TO 57	49	30.11	20	CLEAR	54 TO 57	60	29.73	15	85.4	
0918210524WX	CUMULUS CLOUDING	54 TO 57	49	30.11	20	CLEAR	54 TO 57	60	29.73	15	87.0	
0918212025WX	CUMULUS CLOUDING	54 TO 57	49	30.11	20	CLEAR	54 TO 57	60	29.73	15	84.4	
0918214026WX	CUMULUS CLOUDING	54 TO 57	49	30.11	20	CLEAR	54 TO 57	60	29.73	15	89.4	
0923014001WX	CLEAR	46 TO 49	96	30. 2	20	LIGHT FOG	54 TO 57	86	29.38	9	63.3	
0923032504WX	CLEAR	46 TO 49	96	30. 2	20	LIGHT FOG	54 TO 57	86	29.38	9	81.0	
0923034005WX	LIGHT FOG	46 TO 49	96	29.90	25	LIGHT FOG	54 TO 57	81	29.37	9	73.5	
0923035506WX	LIGHT FOG	46 TO 49	96	29.90	25	LIGHT FOG	54 TO 57	81	29.37	9	76.7	

TEST	WEATHER	RECEIVE SITE TEMP DEGREES F.	REL HUM PERCENT	BARO PRES INCHES MERCURY	WIND SPEED KNOTS	WEATHER	TRANSMIT SITE TEMP DEGREES F.	REL HUM PERCENT	BARO PRES INCHES MERCURY	WIND SPEED KNOTS	SIGNAL STRG -DBM	CLOUD LEVEL FEET
0923041007WX	LIGHT FOG	46 TO 49	96	29.90	25	LIGHT FOG	54 TO 57	81	29.37	9	79.8	
0923042508WX	LIGHT FOG	46 TO 49	96	29.90	25	LIGHT FOG	54 TO 57	81	29.37	9	77.4	
0923051009WX	CLEAR	46 TO 49	99	29.98	25	CLEAR	50 TO 53	78	29.35	9	90.3	
0923052510WX	CLEAR	46 TO 49	99	29.98	25	CLEAR	50 TO 53	78	29.35	9	89.1	
0923054511WX	CLEAR	46 TO 49	99	29.98	25	CLEAR	50 TO 53	78	29.35	9	88.7	
0923060012WX	CLEAR	46 TO 49	99	29.98	25	CLEAR	50 TO 53	78	29.35	9	89.3	
0923061513WX	CLEAR	46 TO 49	99	29.98	25	CLEAR	50 TO 53	78	29.35	9	90.5	
0923065514WX	CLEAR	42 TO 45	99	29.96	20	CLEAR	50 TO 53	82	29.32	12	89.9	
0923071515WX	CLEAR	42 TO 45	99	29.96	20	CLEAR	50 TO 53	82	29.32	12	88.7	
0923073016WX	CLEAR	42 TO 45	99	29.96	20	CLEAR	50 TO 53	82	29.32	12	88.9	
0923075017WX	CLEAR	42 TO 45	99	29.96	20	CLEAR	50 TO 53	82	29.32	12	87.2	
0923080518WX	CLEAR	42 TO 45	99	29.96	20	CLEAR	50 TO 53	82	29.32	12	88.7	
0923093019WX	CLEAR	50 TO 53	99	29.96	20	HAZY	62 TO 65	58	29.30	12	87.5	
0923094520WX	CLEAR	50 TO 53	99	29.96	20	HAZY	62 TO 65	58	29.30	12	87.9	
0924101801WX	RAIN, STAT CLOUD	58 TO 61	99	29.68	15	RAIN, STAT CLOUD	58 TO 61	50	29.75	8	92.8	1700
0924103502WX	RAIN, STAT CLOUD	58 TO 61	99	29.68	15	RAIN, STAT CLOUD	58 TO 61	50	29.75	8	92.2	1700
0924105003WX	RAIN, STAT CLOUD	58 TO 61	99	29.68	15	RAIN, STAT CLOUD	58 TO 61	50	29.75	8	92.8	1700
0924110504WX	RAIN, STAT CLOUD	58 TO 61	99	29.68	15	RAIN, STAT CLOUD	58 TO 61	50	29.75	8	93.7	1700
0924112005WX	RAIN, STAT CLOUD	58 TO 61	99	29.68	15	RAIN, STAT CLOUD	58 TO 61	50	29.75	8	92.9	1700
0924132506NX	RAIN, STAT CLOUD	58 TO 61	99	29.68	15	RAIN, CUM CLOUD	58 TO 61	94	29.13	8	108.6	1700
0924134507NX	RAIN, STAT CLOUD	58 TO 61	99	29.68	15	RAIN, CUM CLOUD	58 TO 61	98	29.13	8	108.1	1700
0924140208WX	CUMULUS CLOUDING	54 TO 57	85	29.74	15	RAIN, CUM CLOUD	58 TO 61	98	29.13	8	97.8	1100
0924142009WX	CUMULUS CLOUDING	54 TO 57	85	29.74	15	RAIN, CUM CLOUD	58 TO 61	98	29.13	8	97.4	1100
0924144010WX	CUMULUS CLOUDING	54 TO 57	85	29.74	15	RAIN, CUM CLOUD	58 TO 61	98	29.13	8	96.7	1100
0924152511WX	CUMULUS CLOUDING	54 TO 57	85	29.74	15	STRATUS CLOUDING	58 TO 61	93	29.14	8	103.3	1100
0924154412WX	CUMULUS CLOUDING	54 TO 57	85	29.74	15	STRATUS CLOUDING	58 TO 61	93	29.14	8	104.1	1100
0924155813WX	CUMULUS CLOUDING	54 TO 57	85	29.74	15	STRATUS CLOUDING	58 TO 61	93	29.14	8	104.8	1100
0924161214WX	CUMULUS CLOUDING	54 TO 57	85	29.74	15	STRATUS CLOUDING	58 TO 61	93	29.14	8	102.2	1100
0925091001NX	STRATUS CLOUDING	46 TO 49	77	29.95	15	RAIN, CUM CLOUD	50 TO 53	90	29.30	9	113.2	
0925093002NX	STRATUS CLOUDING	46 TO 49	77	29.95	15	RAIN, CUM CLOUD	50 TO 53	90	29.30	9	113.9	
0925095003WX	STRATUS CLOUDING	46 TO 49	77	29.95	15	RAIN, CUM CLOUD	50 TO 53	90	29.30	9	99.5	
0925101004WX	STRATUS CLOUDING	46 TO 49	77	29.95	15	RAIN, CUM CLOUD	50 TO 53	90	29.30	9	99.4	
0925110005WX	STRATUS CLOUDING	46 TO 49	93	29.66	13	CUMULUS CLOUDING	54 TO 57	88	29.31	9	99.3	
0925111806WX	STRATUS CLOUDING	46 TO 49	93	29.66	13	CUMULUS CLOUDING	54 TO 57	88	29.31	9	98.8	
0925113507WX	STRATUS CLOUDING	46 TO 49	93	29.66	13	CUMULUS CLOUDING	54 TO 57	88	29.31	9	98.2	
0925115008WX	STRATUS CLOUDING	46 TO 49	93	29.66	13	CUMULUS CLOUDING	54 TO 57	88	29.31	9	96.4	
0925134509WX	CUMULUS CLOUDING	62 TO 65	65	29.67	9	CUMULUS CLOUDING	54 TO 57	72	29.32	7	96.5	3000
0925140210WX	CUMULUS CLOUDING	62 TO 65	65	29.67	9	CUMULUS CLOUDING	54 TO 57	72	29.32	7	97.2	3000
0925141811WX	CUMULUS CLOUDING	62 TO 65	65	29.67	9	CUMULUS CLOUDING	54 TO 57	72	29.32	7	99.0	3000
0925144012WX	CUMULUS CLOUDING	62 TO 65	65	29.67	9	CUMULUS CLOUDING	50 TO 53	70	29.96	8	98.5	3000
0926035501WX	CUMULUS CLOUDING	46 TO 49	88	29.96	1	CUMULUS CLOUDING	46 TO 49	94	29.96	1	96.4	4800
0926041502WX	CUMULUS CLOUDING	46 TO 49	88	29.96	1	CUMULUS CLOUDING	46 TO 49	94	29.96	1	96.0	4800
0926043003WX	CUMULUS CLOUDING	46 TO 49	88	29.96	1	CUMULUS CLOUDING	46 TO 49	94	29.96	1	94.4	4800
0926044504WX	CUMULUS CLOUDING	46 TO 49	88	29.96	1	CUMULUS CLOUDING	46 TO 49	94	29.96	1	94.4	4800
0926050005WX	CUMULUS CLOUDING	46 TO 49	88	29.96	1	CUMULUS CLOUDING	46 TO 49	94	29.96	1	93.3	4800
0926060006NX	CUMULUS CLOUDING	42 TO 45	92	29.95	0	STRATUS CLOUDING	46 TO 49	96	29.96	1	111.6	4500
0926061807NX	CUMULUS CLOUDING	42 TO 45	92	29.95	0	STRATUS CLOUDING	46 TO 49	90	29.96	1	111.7	4500
0926071210WX	CUMULUS CLOUDING	42 TO 45	92	29.95	0	STRATUS CLOUDING	46 TO 49	82	29.33	7	95.0	4500
0926072011WX	CUMULUS CLOUDING	42 TO 45	92	29.95	0	CUMULUS CLOUDING	42 TO 45	82	29.33	7	91.2	4500

TEST RECORD
POINT PETRE, SEPTEMBER

C-BAND

TEST	RECEIVE SITE WEATHER	RECEIVE SITE TEMP DEGREES F.	RECEIVE SITE REL HUM PERCENT	RECEIVE SITE BARO PRES INCHES MERCURY	RECEIVE SITE WIND SPEED KNOTS	TRANSMIT SITE WEATHER	TRANSMIT SITE TEMP DEGREES F.	TRANSMIT SITE REL HUM PERCENT	TRANSMIT SITE BARO PRES INCHES MERCURY	TRANSMIT SITE WIND SPEED KNOTS	SIGNAL STRG -DBM	CLOUD LEVEL FEET
0915203001WC	DARK	66 TO 69	76	29.92	30	DARK	66 TO 69	79	29.92	30	82.3	
0915204602WC	DARK	66 TO 69	76	29.92	30	DARK	66 TO 69	79	29.92	30	79.9	
0915211003WC	DARK	66 TO 69	76	29.92	30	DARK	66 TO 69	79	29.92	30	80.4	
0915212604WC	DARK	66 TO 69	76	29.92	30	DARK	66 TO 69	79	29.92	30	76.6	
0916110001WC	STRATUS CLOUDING	66 TO 69	85	29.91	25	RAIN, STAT CLOUD	70 TO 73	59	29.95	20	84.3	
0916111602WC	STRATUS CLOUDING	66 TO 69	85	29.91	25	RAIN, STAT CLOUD	70 TO 73	59	29.95	20	83.0	
0916113003WC	STRATUS CLOUDING	66 TO 69	85	29.91	25	RAIN, STAT CLOUD	70 TO 73	59	29.95	20	83.3	
0916115404WC	STRATUS CLOUDING	66 TO 69	85	29.91	25	RAIN, STAT CLOUD	70 TO 73	59	29.95	20	82.2	
0916123505WC	STRATUS CLOUDING	66 TO 69	85	29.91	25	RAIN, STAT CLOUD	70 TO 73	59	29.95	20	76.6	
0916133006WC	STRATUS CLOUDING	66 TO 69	85	29.91	25	STRATUS CLOUDING	78 TO 81	65	29.96	23	77.3	
0916134507WC	STRATUS CLOUDING	66 TO 69	85	29.91	25	STRATUS CLOUDING	78 TO 81	65	29.96	23	79.2	
0916140008WC	STRATUS CLOUDING	66 TO 69	85	29.91	25	STRATUS CLOUDING	78 TO 81	65	29.96	23	79.8	
0916151509WC	STRATUS CLOUDING	66 TO 69	85	29.91	25	STRATUS CLOUDING	78 TO 81	65	29.96	20	95.5	
0916153510NC	STRATUS CLOUDING	70 TO 73	73	29.86	30	STRATUS CLOUDING	78 TO 81	65	29.92	20	95.0	
0916155511NC	STRATUS CLOUDING	70 TO 73	73	29.86	30	STRATUS CLOUDING	78 TO 81	65	29.92	20	95.3	
0916161012NC	STRATUS CLOUDING	70 TO 73	73	29.86	30	STRATUS CLOUDING	78 TO 81	65	29.92	20	97.4	
0917094501NC	RAIN, STAT CLOUD	54 TO 57	94	29.93	15	STRATUS CLOUDING	54 TO 57	94	29.93	15	102.5	
0917100502NC	RAIN, STAT CLOUD	54 TO 57	94	29.93	15	STRATUS CLOUDING	54 TO 57	94	29.93	15	98.6	
0917110203WC	STRATUS CLOUDING	50 TO 53	94	30. 1	55	STRATUS CLOUDING	54 TO 57	94	29.93	15	79.0	
0917113505WC	STRATUS CLOUDING	50 TO 53	94	30. 1	55	STRATUS CLOUDING	54 TO 57	94	29.93	15	75.5	
0917115606WC	STRATUS CLOUDING	50 TO 53	94	30. 1	55	STRATUS CLOUDING	54 TO 57	94	29.93	15	77.5	
0917140407WC	STRATUS CLOUDING	54 TO 57	73	30. 3	15	STRATUS CLOUDING	54 TO 57	81	29.42	6	82.9	
0917142008WC	STRATUS CLOUDING	54 TO 57	73	30. 3	15	STRATUS CLOUDING	54 TO 57	81	29.42	6	82.5	
0917151009WC	STRATUS CLOUDING	54 TO 57	73	30. 3	15	STRATUS CLOUDING	54 TO 57	81	29.42	6	84.8	
0917152510WC	STRATUS CLOUDING	54 TO 57	73	30. 3	15	STRATUS CLOUDING	54 TO 57	81	29.42	6	85.2	
0917160012WC	STRATUS CLOUDING	54 TO 57	66	30. 5	15	STRATUS CLOUDING	54 TO 57	83	29.42	6	83.3	
0918091501WC	CLEAR	50 TO 53	81	30.36	10	CUMULUS CLOUDING	50 TO 53	86	29.67	17	84.1	
0918093502WC	CLEAR	50 TO 53	81	30.36	10	CUMULUS CLOUDING	50 TO 53	86	29.67	17	82.7	
0918095003WC	CLEAR	50 TO 53	81	30.36	10	CUMULUS CLOUDING	50 TO 53	86	29.67	17	81.8	
0918100504WC	CLEAR	50 TO 53	81	30.36	10	CUMULUS CLOUDING	50 TO 53	86	29.67	17	80.1	
0918110005WC	CLEAR	50 TO 53	81	30.36	10	CUMULUS CLOUDING	50 TO 53	86	29.67	17	83.0	
0918111606WC	CLEAR	50 TO 53	81	30.36	10	CUMULUS CLOUDING	50 TO 53	86	29.67	17	85.8	
0918113507WC	CUMULUS CLOUDING	54 TO 57	69	30.36	15	CUMULUS CLOUDING	62 TO 65	53	29.70	17	89.1	
0918115408WC	CUMULUS CLOUDING	54 TO 57	69	30.36	15	CUMULUS CLOUDING	62 TO 65	53	29.70	17	89.0	
0918133209WC	CLEAR	58 TO 61	55	30.36	13	CLEAR	66 TO 69	48	29.71	17	87.6	
0918135010WC	CLEAR	58 TO 61	55	30.36	13	CLEAR	66 TO 69	48	29.71	17	87.2	
0918140611WC	CLEAR	58 TO 61	55	30.36	13	CLEAR	66 TO 69	48	29.71	17	86.8	
0918142512WC	CLEAR	58 TO 61	55	30.36	13	CLEAR	66 TO 69	48	29.71	17	89.9	
0918153013WC	CUMULUS CLOUDING	58 TO 61	52	30. 7	10	CLEAR	66 TO 69	45	29.71	17	90.5	
0918155014WC	CUMULUS CLOUDING	58 TO 61	52	30. 7	10	CLEAR	66 TO 69	45	29.71	17	90.1	
0918165015WC	CUMULUS CLOUDING	58 TO 61	52	30. 7	10	CLEAR	66 TO 69	45	29.71	17	92.9	
0918170516WC	CUMULUS CLOUDING	58 TO 61	52	30. 7	10	CLEAR	66 TO 69	45	29.71	17	90.4	
0918172017WC	CUMULUS CLOUDING	58 TO 61	52	30. 7	10	CLEAR	66 TO 69	45	29.71	17	89.6	
0918173518WC	CUMULUS CLOUDING	58 TO 61	52	30. 7	10	CLEAR	66 TO 69	45	29.71	17	90.4	
0918175519WC	CUMULUS CLOUDING	58 TO 61	52	30. 7	10	CLEAR	66 TO 69	45	29.71	17	91.0	
0918190520NC	CUMULUS CLOUDING	54 TO 57	52	30. 7	10	CLEAR	62 TO 65	45	29.71	17	104.9	
0918193021NC	CUMULUS CLOUDING	54 TO 57	49	30.11	20	CLEAR	62 TO 65	40	29.73	15	103.4	

TEST	RECEIVE SITE WEATHER	RECEIVE SITE TEMP DEGREES F.	RECEIVE SITE REL HUM PERCENT	RECEIVE SITE BARO PRES INCHES MERCURY	RECEIVE SITE WIND SPEED KNOTS	TRANSMIT SITE WEATHER	TRANSMIT SITE TEMP DEGREES F.	TRANSMIT SITE REL HUM PERCENT	TRANSMIT SITE BARO PRES INCHES MERCURY	TRANSMIT SITE WIND SPEED KNOTS	SIGNAL STRG -DBM	CLOUD LEVEL FEET
0918194522NC	CUMULUS CLOUDING	54 TO 57	49	30.17	20	CLEAR	62 TO 65	40	29.73	15	103.5	
0918205023WC	CUMULUS CLOUDING	54 TO 57	49	30.17	20	CLEAR	54 TO 57	69	29.73	15	85.3	
0918210524WC	CUMULUS CLOUDING	54 TO 57	49	30.17	20	CLEAR	54 TO 57	69	29.73	15	85.1	
0918212025WC	CUMULUS CLOUDING	54 TO 57	49	30.17	20	CLEAR	54 TO 57	69	29.73	15	86.2	
0918214026WC	CUMULUS CLOUDING	54 TO 57	49	30.17	20	CLEAR	54 TO 57	69	29.73	15	86.5	
0923032504WC	CLEAR	46 TO 49	96	30.[illegible]	20	LIGHT FOG	54 TO 57	86	29.38	9	66.3	
0923034005WC	LIGHT FOG	46 TO 49	96	29.90	25	LIGHT FOG	54 TO 57	81	29.37	9	67.1	
0923035506WC	LIGHT FOG	46 TO 49	96	29.90	25	LIGHT FOG	54 TO 57	81	29.37	9	65.5	
0923041007WC	LIGHT FOG	46 TO 49	96	29.90	25	LIGHT FOG	54 TO 57	81	29.37	9	66.5	
0923042508WC	LIGHT FOG	46 TO 49	96	29.90	25	LIGHT FOG	54 TO 57	81	29.37	9	66.6	
0923051009WC	CLEAR	46 TO 49	99	29.90	25	CLEAR	50 TO 53	78	29.35	9	85.8	
0923052510WC	CLEAR	46 TO 49	99	29.98	25	CLEAR	50 TO 53	79	29.35	9	85.1	
0923054511WC	CLEAR	46 TO 49	99	29.98	25	CLEAR	50 TO 53	78	29.35	9	84.2	
0923060012WC	CLEAR	46 TO 49	99	29.98	25	CLEAR	50 TO 53	78	29.35	9	84.6	
0923061513WC	CLEAR	46 TO 49	99	29.98	25	CLEAR	50 TO 53	78	29.35	9	83.5	
0923065514WC	CLEAR	42 TO 45	99	29.96	20	CLEAR	50 TO 53	82	29.32	12	84.0	
0923071515WC	CLEAR	42 TO 45	99	29.96	20	CLEAR	50 TO 53	82	29.32	12	83.3	
0923073016WC	CLEAR	42 TO 45	99	29.96	20	CLEAR	50 TO 53	82	29.32	12	82.6	
0923075017WC	CLEAR	42 TO 45	99	29.96	20	CLEAR	50 TO 53	82	29.32	12	82.0	
0923080518WC	CLEAR	42 TO 45	99	29.96	20	CLEAR	50 TO 53	82	29.32	12	82.6	
0923093019WC	CLEAR	50 TO 53	99	29.96	20	HAZY	62 TO 65	58	29.30	12	81.9	
0923094520WC	CLEAR	50 TO 53	99	29.96	20	HAZY	62 TO 65	58	29.30	12	82.1	
0924101801WC	RAIN, STAT CLOUD	58 TO 61	99	29.68	15	RAIN, STAT CLOUD	58 TO 61	59	29.75	8	91.1	1700
0924103502WC	RAIN, STAT CLOUD	58 TO 61	99	29.68	15	RAIN, STAT CLOUD	58 TO 61	59	29.75	8	89.7	1700
0924105003WC	RAIN, STAT CLOUD	58 TO 61	99	29.68	15	RAIN, STAT CLOUD	58 TO 61	59	29.75	8	89.9	1700
0924110504NC	RAIN, STAT CLOUD	58 TO 61	99	29.68	15	RAIN, STAT CLOUD	58 TO 61	59	29.75	8	107.4	1700
0924112005NC	RAIN, STAT CLOUD	58 TO 61	99	29.68	15	RAIN, STAT CLOUD	58 TO 61	98	29.13	8	104.6	1700
0924132506WC	RAIN, STAT CLOUD	58 TO 61	99	29.68	15	RAIN, CUM CLOUD	58 TO 61	98	29.13	8	90.7	1700
0924134507WC	RAIN, STAT CLOUD	58 TO 61	99	29.68	15	RAIN, CUM CLOUD	58 TO 61	98	29.13	8	88.5	1700
0924140208WC	CUMULUS CLOUDING	54 TO 57	85	29.74	15	RAIN, CUM CLOUD	58 TO 61	98	29.13	8	92.9	1100
0924142009WC	CUMULUS CLOUDING	54 TO 57	85	29.74	15	RAIN, CUM CLOUD	58 TO 61	98	29.13	8	92.0	1100
0924144010WC	CUMULUS CLOUDING	54 TO 57	85	29.74	15	RAIN, CUM CLOUD	58 TO 61	98	29.13	8	90.4	1100
0924152511WC	CUMULUS CLOUDING	54 TO 57	85	29.74	15	STRATUS CLOUDING	58 TO 61	93	29.14	8	96.2	1100
0924154412WC	CUMULUS CLOUDING	54 TO 57	85	29.74	15	STRATUS CLOUDING	58 TO 61	93	29.14	8	95.5	1100
0924155813WC	CUMULUS CLOUDING	54 TO 57	85	29.74	15	STRATUS CLOUDING	58 TO 61	93	29.14	8	97.0	1100
0924161214WC	CUMULUS CLOUDING	54 TO 57	85	29.74	15	STRATUS CLOUDING	58 TO 61	93	29.14	8	95.2	1100
0925091001WC	STRATUS CLOUDING	46 TO 49	77	29.95	15	RAIN, CUM CLOUD	50 TO 53	90	29.30	9	92.4	
0925093002WC	STRATUS CLOUDING	46 TO 49	77	29.95	15	RAIN, CUM CLOUD	50 TO 53	90	29.30	9	92.5	
0925095003WC	STRATUS CLOUDING	46 TO 49	77	29.95	15	RAIN, CUM CLOUD	50 TO 53	90	29.30	9	92.7	
0925101004WC	STRATUS CLOUDING	46 TO 49	77	29.95	15	RAIN, CUM CLOUD	50 TO 53	90	29.30	9	93.1	
0925110005WC	STRATUS CLOUDING	46 TO 49	73	29.66	13	CUMULUS CLOUDING	54 TO 57	88	29.31	9	94.2	
0925111806WC	STRATUS CLOUDING	46 TO 49	73	29.66	13	CUMULUS CLOUDING	54 TO 57	88	29.31	9	94.4	
0925113507WC	STRATUS CLOUDING	46 TO 49	73	29.66	13	CUMULUS CLOUDING	54 TO 57	88	29.31	9	94.5	
0925115008WC	STRATUS CLOUDING	46 TO 49	73	29.66	13	CUMULUS CLOUDING	54 TO 57	88	29.31	9	93.5	
0925134509NC	CUMULUS CLOUDING	62 TO 65	65	29.67	9	CUMULUS CLOUDING	54 TO 57	72	29.32	7	99.9	3000
0925140210NC	CUMULUS CLOUDING	62 TO 65	65	29.67	9	CUMULUS CLOUDING	54 TO 57	72	29.32	7	105.9	3000
0925141811WC	CUMULUS CLOUDING	62 TO 65	65	29.67	9	CUMULUS CLOUDING	54 TO 57	72	29.32	7	90.4	3000
0926035501NC	CUMULUS CLOUDING	46 TO 49	88	29.94	1	CUMULUS CLOUDING	46 TO 49	94	29.96	1	101.7	4800
0926041502NC	CUMULUS CLOUDING	46 TO 49	88	29.94	1	CUMULUS CLOUDING	46 TO 49	94	29.96	1	101.6	4800
0926043003NC	CUMULUS CLOUDING	46 TO 49	88	29.94	1	CUMULUS CLOUDING	46 TO 49	94	29.96	1	99.5	4800
0926044504WC	CUMULUS CLOUDING	46 TO 49	88	29.94	1	CUMULUS CLOUDING	46 TO 49	94	29.96	1	89.5	4800
0926050005WC	CUMULUS CLOUDING	46 TO 49	88	29.94	1	CUMULUS CLOUDING	46 TO 49	94	29.96	1	88.9	4800
0926060006WC	CUMULUS CLOUDING	42 TO 45	92	29.95	0	STRATUS CLOUDING	46 TO 49	98	29.96	1	91.2	4500
0926061807WC	CUMULUS CLOUDING	42 TO 45	92	29.95	0	STRATUS CLOUDING	46 TO 49	90	29.96	1	91.4	4500
0926063508WC	CUMULUS CLOUDING	42 TO 45	92	29.95	0	STRATUS CLOUDING	46 TO 49	98	29.96	1	89.6	4500

TEST	RECEIVE SITE WEATHER	RECEIVE SITE TEMP DEGREES F.	RECEIVE SITE REL HUM PERCENT	RECEIVE SITE BARO PRES INCHES MERCURY	RECEIVE SITE WIND SPEED KNOTS	TRANSMIT SITE WEATHER	TRANSMIT SITE TEMP DEGREES F.	TRANSMIT SITE REL HUM PERCENT	TRANSMIT SITE BARO PRES INCHES MERCURY	TRANSMIT SITE WIND SPEED KNOTS	SIGNAL STRG -DBM	CLOUD LEVEL FEET
0926065009WC	CUMULUS CLOUDING	42 TO 45	92	29.96	0	STRATUS CLOUDING	46 TO 49	98	29.96	1	89.2	4500
0926071210WC	CUMULUS CLOUDING	42 TO 45	92	29.96	0	CUMULUS CLOUDING	42 TO 45	98	29.96	1	89.5	4500

TEST RECORD
ONTARIO CENTER, OCTOBER

X-BAND

TEST	WEATHER	RECEIVE SITE TEMP DEGREES F.	REL HUM PERCENT	BARO PRES INCHES MERCURY	WIND SPEED KNOTS	WEATHER	TRANSMIT SITE TEMP DEGREES F.	REL HUM PERCENT	BARO PRES INCHES MERCURY	W. SP. KNOTS	SIGNAL STRG -DBM	CLOUD LEVEL FEET
1003143001WX	CUMULUS CLOUDING	66 TO 69	84	29.98	12	CUMULUS CLOUDING	62 TO 65	92	30. 0	[illegible]	[illegible]3.0	4500
1003145002WX	CUMULUS CLOUDING	66 TO 69	84	29.98	12	CUMULUS CLOUDING	62 TO 65	92	30. 0	[illegible]	91.1	4500
1003151403WX	CUMULUS CLOUDING	66 TO 69	84	29.98	12	CUMULUS CLOUDING	62 TO 65	92	30. 0	10	89.3	4500
1003153604WX	CUMULUS CLOUDING	66 TO 69	84	29.98	12	CUMULUS CLOUDING	62 TO 65	92	30. 0	10	87.9	4500
1003163005WX	HEAVY FOG	62 TO 65	87	30. [illegible]	9	CUMULUS CLOUDING	62 TO 65	92	30. 0	10	85.5	1900
1003165606WX	HEAVY FOG	62 TO 65	87	30. [illegible]	9	CUMULUS CLOUDING	62 TO 65	85	30. 1	10	82.7	1900
1003172007WX	HEAVY FOG	62 TO 65	87	30. [illegible]	9	CUMULUS CLOUDING	62 TO 65	85	30. 1	10	81.1	1900
1003174008WX	STRATUS CLOUDING	66 TO 69	78	30. [illegible]	9	CUMULUS CLOUDING	62 TO 65	85	30. 1	10	83.3	1600
1006172001WX	SIRUS CLOUDING	66 TO 69	55	30.1[illegible]	10	SIRUS CLOUDING	70 TO 73	28	30. 6	10	86.1	25K
1006174602WX	SIRUS CLOUDING	66 TO 69	55	30.1[illegible]	10	SIRUS CLOUDING	70 TO 73	28	30. 6	10	84.3	25K
1006181003WX	SIRUS CLOUDING	66 TO 69	55	30.1[illegible]	10	SIRUS CLOUDING	70 TO 73	28	30. 6	10	84.4	25K
1006183204WX	SIRUS CLOUDING	62 TO 65	59	30.1[illegible]	2	ALTO CUMULUS	62 TO 65	27	30. 4	10	85.6	25K
1006193605WX	SIRUS CLOUDING	62 TO 65	59	30.1[illegible]	2	ALTO CUMULUS	62 TO 65	27	30. 4	10	82.0	25K
1006200006WX	SIRUS CLOUDING	62 TO 65	73	30.1[illegible]	2	ALTO CUMULUS	62 TO 65	53	30.40	9	77.9	25K
1006202407WX	SIRUS CLOUDING	62 TO 65	73	30.1[illegible]	2	ALTO CUMULUS	62 TO 65	53	30.40	9	78.3	25K
1006204608WX	SIRUS CLOUDING	62 TO 65	73	30.1[illegible]	2	ALTO CUMULUS	62 TO 65	53	30.40	9	62.6	25K
1006210609WX	SIRUS CLOUDING	54 TO 57	87	30. [illegible]	6	ALTO CUMULUS	62 TO 65	52	30. 4	7	81.2	25K
1006220010WX	SIRUS CLOUDING	54 TO 57	87	30. [illegible]	6	ALTO CUMULUS	58 TO 61	60	30. 3	7	67.5	25K
1007102001WX	ALTO CUMULUS	58 TO 61	70	29.90	9	SIRUS CLOUDING	54 TO 57	68	29.27	14	78.5	12K
1007114002WX	ALTO CUMULUS	62 TO 65	70	29.98	9	SIRUS CLOUDING	66 TO 69	61	29.25	14	103.9	12K
1007123003WX	ALTO CUMULUS	62 TO 65	63	29.97	10	SIRUS CLOUDING	66 TO 69	61	29.25	14	104.7	12K
1007130004WX	ALTO CUMULUS	62 TO 65	63	29.97	10	RAIN, CUM CLOUD	66 TO 69	68	29.25	15	81.9	12K
1007132005WX	ALTO CUMULUS	62 TO 65	63	29.97	10	RAIN, CUM CLOUD	66 TO 69	68	29.25	15	105.9	12K
1007135006WX	ALTO CUMULUS	66 TO 69	63	29.94	10	RAIN, CUM CLOUD	66 TO 69	68	29.25	15	99.2	12K
1007145408WX	RAIN, CUM CLOUD	66 TO 69	66	29.94	10	RAIN, CUM CLOUD	66 TO 69	81	29.24	17	85.3	12K
1007154010WX	ALTO CUMULUS	62 TO 65	63	29.93	11	CUMULUS CLOUDING	62 TO 65	87	29.24	17	87.4	12K
1007160011WX	ALTO CUMULUS	62 TO 65	63	29.93	11	CUMULUS CLOUDING	62 TO 65	87	29.24	17	90.6	12K
1008110001WX	CLEAR	62 TO 65	63	29.90	10	ALTO CUMULUS	66 TO 69	63	29.28	26	74.0	5000
1008113002WX	CLEAR	62 TO 65	63	29.90	10	ALTO CUMULUS	66 TO 69	63	29.28	26	72.9	5000
1008115603WX	CLEAR	62 TO 65	63	29.90	10	ALTO CUMULUS	66 TO 69	63	29.28	26	73.4	5000
1008121004WX	CUMULUS CLOUDING	66 TO 69	38	29.94	17	ALTO CUMULUS	66 TO 69	63	29.28	26	73.3	5000
1008131005WX	CUMULUS CLOUDING	70 TO 73	38	29.94	17	ALTO CUMULUS	66 TO 69	63	29.28	26	81.4	5000
1008133406WX	CUMULUS CLOUDING	70 TO 73	38	29.94	17	CUMULUS CLOUDING	70 TO 73	48	29.24	25	81.5	5000
1008141408WX	CUMULUS CLOUDING	70 TO 73	38	29.94	17	CUMULUS CLOUDING	70 TO 73	48	29.29	20	76.1	5000
1008155009WX	CUMULUS CLOUDING	66 TO 69	32	29.93	20	CUMULUS CLOUDING	62 TO 65	42	29.25	20	84.7	5000
1008161010WX	CUMULUS CLOUDING	62 TO 65	54	29.92	24	CUMULUS CLOUDING	62 TO 65	42	29.25	20	80.6	5000
1008163211WX	CUMULUS CLOUDING	62 TO 65	54	29.92	24	CUMULUS CLOUDING	62 TO 65	42	29.25	20	80.3	5000
1009093201WX	CLEAR	50 TO 53	71	30.23	7	CLEAR	54 TO 57	57	29.52	14	84.9	
1009100002WX	CLEAR	50 TO 53	71	30.23	7	CLEAR	54 TO 57	57	29.52	14	86.7	
1009103003WX	CLEAR	54 TO 57	71	30.23	7	CLEAR	54 TO 57	57	29.52	14	87.5	
1009105604WX	CLEAR	58 TO 61	57	30.22	5	CLEAR	58 TO 61	55	29.52	11	84.4	
1009123005WX	CLEAR	62 TO 65	57	30.22	5	CLEAR	62 TO 65	50	29.50	11	92.2	
1009145007WX	CLEAR	66 TO 69	39	30.13	8	CLEAR	66 TO 69	44	29.48	10	73.4	
1009152008WX	CLEAR	66 TO 69	39	30.13	8	CLEAR	66 TO 69	46	29.48	10	74.2	
1009154009WX	CLEAR	66 TO 69	39	30.13	8	CLEAR	66 TO 69	46	29.48	10	73.7	
1009160010WX	CLEAR	66 TO 69	39	30.13	8	CLEAR	66 TO 69	44	29.48	10	75.7	
1009165011WX	CLEAR	58 TO 61	45	30.1[illegible]	3	CLEAR	62 TO 65	51	29.40	18	86.0	

TEST	RECEIVE SITE WEATHER	RECEIVE SITE TEMP DEGREES F.	RECEIVE SITE REL HUM PERCENT	RECEIVE SITE BARO PRES INCHES MERCURY	RECEIVE SITE WIND SPEED KNOTS	TRANSMIT SITE WEATHER	TRANSMIT SITE TEMP DEGREES F.	TRANSMIT SITE REL HUM PERCENT	TRANSMIT SITE BARO PRES INCHES MERCURY	TRANSMIT SITE WIND SPEED KNOTS	SIGNAL STRG -DBM	CLOUD LEVEL FEET
1009191012*X	CLEAR	58 TO 61	45	30.10	3	CLEAR	62 TO 65	51	29.40	18	83.9	
1009195013WX	CLEAR	50 TO 53	45	30.10	3	CLEAR	58 TO 61	51	29.40	18	80.2	
1009201414WX	CLEAR	54 TO 57	74	30.10	2	CLEAR	54 TO 57	64	29.39	18	72.5	
1009212015WX	CLEAR	50 TO 53	86	30.10	0	CLEAR	50 TO 53	74	29.39	18	67.6	
1009214016WX	CLEAR	50 TO 53	86	30.10	0	CLEAR	50 TO 53	74	29.39	18	69.5	
1009220017WX	CLEAR	46 TO 49	86	30.10	0	CLEAR	54 TO 57	71	29.39	17	73.5	
1013172501WX	STRUS CLOUDING	74 TO 77	60	29.73	20	ALTO CUMULUS	78 TO 81	54	29. 8	25	85.8	25K
1013181003WX	STRATUS CLOUDING	78 TO 81	60	29.73	20	ALTO CUMULUS	78 TO 81	54	29. 8	25	88.5	25K
1013183504WX	STRUS CLOUDING	74 TO 77	60	29.73	20	ALTO CUMULUS	74 TO 77	60	29. 5	25	90.4	15K
1013194505NX	STRUS CLOUDING	78 TO 81	60	29.73	20	ALTO CUMULUS	74 TO 77	60	29. 5	25	108.3	15K
1013201206WX	STRUS CLOUDING	78 TO 81	60	29.73	20	ALTO CUMULUS	74 TO 77	60	29. 5	25	88.7	15K
1013203507WX	STRUS CLOUDING	74 TO 77	62	29.70	20	ALTO CUMULUS	74 TO 77	60	29. 5	25	88.1	25K
1013210008WX	STRUS CLOUDING	74 TO 77	62	29.70	20	ALTO CUMULUS	74 TO 77	60	29. 5	25	86.9	25K
1013223010WX	STRUS CLOUDING	74 TO 77	57	29.69	25	ALTO CUMULUS	74 TO 77	60	29. 1	20	84.6	25K
1013225011WX	STRUS CLOUDING	74 TO 77	57	29.69	25	CUMULUS CLOUDING	70 TO 73	76	29. 1	16	81.8	25K
1013231012WX	STRUS CLOUDING	70 TO 73	59	29.67	40	CUMULUS CLOUDING	70 TO 73	76	29. 1	16	81.4	20K
1014105801WX	CUMULUS CLOUDING	50 TO 53	61	30. 0	15	CUMULUS CLOUDING	50 TO 53	51	29.36	24	84.6	3300
1014112502WX	CUMULUS CLOUDING	50 TO 53	61	30. 0	15	CUMULUS CLOUDING	50 TO 53	51	29.36	24	87.5	3300
1014120504WX	CUMULUS CLOUDING	50 TO 53	61	30. 1	13	CUMULUS CLOUDING	50 TO 53	51	29.36	24	83.7	3300
1014153005NX	CUMULUS CLOUDING	50 TO 53	54	30. 2	15	CUMULUS CLOUDING	50 TO 53	47	29.39	15	99.6	3800
1014155006WX	CUMULUS CLOUDING	50 TO 53	54	30. 2	15	CUMULUS CLOUDING	50 TO 53	47	29.39	15	99.0	3800
1014161207WX	CUMULUS CLOUDING	50 TO 53	54	30. 2	15	CUMULUS CLOUDING	50 TO 53	47	29.39	15	82.3	3800
1014163208WX	CUMULUS CLOUDING	50 TO 53	50	30. 4	18	CUMULUS CLOUDING	50 TO 53	50	29.39	18	86.3	3800
1014165009WX	CUMULUS CLOUDING	50 TO 53	50	30. 4	18	CUMULUS CLOUDING	50 TO 53	50	29.39	18	86.3	3800
1015090001NX	CLEAR	34 TO 37	85	30.19	5	CLEAR	42 TO 45	73	29.54	3	106.6	
1015092002WX	CLEAR	42 TO 45	85	30.19	5	CLEAR	42 TO 45	73	29.54	3	87.7	
1015095603WX	CLEAR	42 TO 45	85	30.19	5	CLEAR	42 TO 45	73	29.54	3	88.4	
1015101604WX	CLEAR	46 TO 49	65	30.21	5	CUMULUS CLOUDING	54 TO 57	48	29.55	3	80.1	
1015120006WX	CUMULUS CLOUDING	54 TO 57	56	30.21	7	CUMULUS CLOUDING	54 TO 57	43	29.55	5	94.5	3000
1015122407WX	CUMULUS CLOUDING	50 TO 53	56	30.21	7	CUMULUS CLOUDING	54 TO 57	43	29.55	5	85.0	3000
1015124408WX	CUMULUS CLOUDING	50 TO 53	50	30.21	11	CUMULUS CLOUDING	54 TO 57	43	29.55	5	84.5	3000
1016124001WX	STRATUS CLOUDING	50 TO 53	77	29.79	14	RAIN, STAT CLOUD	54 TO 57	86	29.66	13	91.6	3000
1016130602WX	STRATUS CLOUDING	50 TO 53	77	29.70	14	STRATUS CLOUDING	58 TO 61	84	29. 4	20	90.8	3000
1016133203WX	RAIN, STAT CLOUD	50 TO 53	77	29.76	14	STRATUS CLOUDING	58 TO 61	84	29. 4	20	86.8	3000
1016140004WX	CUMULUS CLOUDING	54 TO 57	69	29.76	19	CUMULUS CLOUDING	54 TO 57	84	29. 3	20	83.0	3000
1016152005NX	CUMULUS CLOUDING	54 TO 57	69	29.72	17	RAIN, CUM CLOUD	54 TO 57	69	29.66	12	74.5	1000
1016154606WX	CUMULUS CLOUDING	58 TO 61	69	29.72	17	RAIN, CUM CLOUD	54 TO 57	69	29.66	12	78.3	1000
1016161207WX	CUMULUS CLOUDING	54 TO 57	72	29.72	14	RAIN, CUM CLOUD	58 TO 61	69	29.66	14	82.0	3000
1016164008WX	CUMULUS CLOUDING	54 TO 57	72	29.72	14	RAIN, CUM CLOUD	58 TO 61	69	29.66	14	85.5	3000
1016170809WX	RAIN, CUM CLOUD	54 TO 57	82	29.73	10	RAIN, CUM CLOUD	58 TO 61	69	29.71	17	84.9	4500
1017060001NX	CUMULUS CLOUDING	46 TO 49	71	29.82	10	CUMULUS CLOUDING	46 TO 49	36	29.77	14	106.7	5000
1017064002NX	CUMULUS CLOUDING	46 TO 49	71	29.82	10	CUMULUS CLOUDING	46 TO 49	36	29.77	14	105.9	5000
1017070003NX	ALTO CUMULUS	46 TO 49	71	29.77	14	ALTO CUMULUS	46 TO 49	65	29.82	8	105.8	7000
1017073204NX	ALTO CUMULUS	46 TO 49	71	29.77	14	ALTO CUMULUS	46 TO 49	65	29.82	8	107.7	7000
1017075605NX	ALTO CUMULUS	46 TO 49	71	29.77	14	ALTO CUMULUS	46 TO 49	64	29.82	8	86.3	7000
1017114607WX	CUMULUS CLOUDING	46 TO 49	68	29.86	14	ALTO CUMULUS	50 TO 53	61	29.86	24	83.5	3000
1017120608WX	RAIN, CUM CLOUD	50 TO 53	68	29.86	14	ALTO CUMULUS	50 TO 53	61	29.86	24	83.4	3000
1020110602WX	CUMULUS CLOUDING	58 TO 61	81	29.70	20	CUMULUS CLOUDING	58 TO 61	90	29.71	21	81.8	7000
1020113603WX	CUMULUS CLOUDING	58 TO 61	81	29.78	20	CUMULUS CLOUDING	58 TO 61	90	29.71	21	77.6	7000
1020120004WX	CUMULUS CLOUDING	58 TO 61	73	29.76	12	RAIN, CUM CLOUD	62 TO 65	81	29.70	12	78.6	3300
1020123205WX	CUMULUS CLOUDING	58 TO 61	73	29.76	12	RAIN, CUM CLOUD	62 TO 65	81	29.70	12	82.8	3300
1020153206WX	CUMULUS CLOUDING	66 TO 69	71	29.64	23	RAIN, CUM CLOUD	62 TO 65	84	29.63	25	92.7	3300
1020162007WX	RAIN, CUM CLOUD	62 TO 65	78	29.65	25	RAIN, CUM CLOUD	62 TO 65	80	29.64	29	93.2	1800
1021043001WX	RAIN, CUM CLOUD	50 TO 53	89	29.62	9	CUMULUS CLOUDING	50 TO 53	83	29.63	14	92.3	1800
1021045602WX	RAIN, CUM CLOUD	50 TO 53	89	29.62	9	CUMULUS CLOUDING	50 TO 53	83	29.63	14	84.6	1800

TEST	RECEIVE SITE WEATHER	RECEIVE SITE TEMP DEGREES F.	RECEIVE SITE REL HUM PERCENT	RECEIVE SITE BARO PRES INCHES MERCURY	RECEIVE SITE WIND SPEED KNOTS	TRANSMIT SITE WEATHER	TRANSMIT SITE TEMP DEGREES F.	TRANSMIT SITE REL HUM PERCENT	TRANSMIT SITE BARO PRES INCHES MERCURY	TRANSMIT SITE WIND SPEED KNOTS	SIGNAL STRG -DBM	CLOUD LEVEL FEET
1021052203*X	CUMULUS CLOUDING	46 TO 49	89	29.65	10	CUMULUS CLOUDING	50 TO 53	86	29.63	13	89.4	2800
1021055004*X	CUMULUS CLOUDING	46 TO 49	89	29.65	10	CUMULUS CLOUDING	50 TO 53	86	29.63	13	88.7	2800
1021061605*X	CUMULUS CLOUDING	46 TO 49	89	29.69	8	CUMULUS CLOUDING	50 TO 53	78	29.70	14	91.0	1500
1021071206*X	CUMULUS CLOUDING	46 TO 49	86	29.72	10	CUMULUS CLOUDING	50 TO 53	84	29.71	10	88.7	2800
1021074607*X	CUMULUS CLOUDING	46 TO 49	86	29.72	10	CUMULUS CLOUDING	50 TO 53	84	29.71	10	91.6	2800
1021082008*X	CUMULUS CLOUDING	42 TO 45	89	29.72	7	CUMULUS CLOUDING	46 TO 49	89	29.70	10	85.2	3300
1021084009*X	CUMULUS CLOUDING	42 TO 45	89	29.72	7	CUMULUS CLOUDING	46 TO 49	89	29.70	10	85.6	3300
1021090010*X	CUMULUS CLOUDING	46 TO 49	86	29.77	7	CUMULUS CLOUDING	50 TO 53	86	29.72	11	85.9	2300
1022122003*X	LIGHT SNOW	34 TO 37	89	29.80	12	CUMULUS CLOUDING	34 TO 37	73	29.87	14	89.7	1500
1022124004*X	LIGHT SNOW	34 TO 37	89	29.80	12	CUMULUS CLOUDING	34 TO 37	73	29.87	14	88.8	1500
1022130005*X	CUMULUS CLOUDING	34 TO 37	82	29.91	10	LIGHT SNOW	38 TO 41	64	29.26	14	89.1	1300
1022132406*X	CUMULUS CLOUDING	34 TO 37	82	29.91	10	LIGHT SNOW	38 TO 41	64	29.26	14	84.8	1300
1022134407*X	CUMULUS CLOUDING	34 TO 37	82	29.91	10	LIGHT SNOW	38 TO 41	64	29.26	14	86.3	1300
1022140008*X	LIGHT SNOW	38 TO 41	79	29.92	15	CUMULUS CLOUDING	34 TO 37	64	29.90	15	88.1	1300
1023101401*X	LIGHT SNOW	34 TO 37	54	29.77	17	CUMULUS CLOUDING	34 TO 37	54	29.77	11	84.8	3800
1023104602*X	CUMULUS CLOUDING	34 TO 37	45	30.46	11	CUMULUS CLOUDING	34 TO 37	54	30.45	13	86.2	3800
1023114603*X	CUMULUS CLOUDING	34 TO 37	42	30.48	12	CUMULUS CLOUDING	34 TO 37	54	30.47	14	93.7	4000
1023120604*X	CUMULUS CLOUDING	34 TO 37	42	30.48	12	CUMULUS CLOUDING	34 TO 37	54	30.47	14	95.0	4000
1023125605*X	CUMULUS CLOUDING	34 TO 37	40	30.49	15	CUMULUS CLOUDING	34 TO 37	54	30.45	13	90.4	4000
1023132006*X	CUMULUS CLOUDING	34 TO 37	40	30.49	15	CUMULUS CLOUDING	34 TO 37	54	30.45	13	90.5	4000
1023134607*X	CUMULUS CLOUDING	34 TO 37	45	30.56	13	CUMULUS CLOUDING	34 TO 37	54	30.46	13	89.5	4000
1023143408*X	CUMULUS CLOUDING	34 TO 37	45	30.56	13	CUMULUS CLOUDING	34 TO 37	54	30.46	13	97.7	4000

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ONTARIO CENTER, OCTOBER

C-HAND

TEST	RECEIVE SITE WEATHER	RECEIVE SITE TEMP DEGREES F.	RECEIVE SITE REL HUM PERCENT	RECEIVE SITE BARO PRES INCHES MERCURY	RECEIVE SITE WIND SPEED KNOTS	TRANSMIT SITE WEATHER	TRANSMIT SITE TEMP DEGREES F.	TRANSMIT SITE REL HUM PERCENT	TRANSMIT SITE BARO PRES INCHES MERCURY	TRANSMIT SITE WIND SPEED KNOTS	SIGNAL STRG -DBM	CLOUD LEVEL FEET
1003143001WC	CUMULUS CLOUDING	66 TO 69	84	29.98	12	CUMULUS CLOUDING	62 TO 65	92	30. 0	10	86.5	4500
1003153604WC	CUMULUS CLOUDING	66 TO 69	84	29.98	12	CUMULUS CLOUDING	62 TO 65	92	30. 0	10	84.7	4500
1003163005WC	HEAVY FOG	62 TO 65	87	30. 0	9	CUMULUS CLOUDING	62 TO 65	92	30. 0	10	80.7	1900
1003165606WC	HEAVY FOG	62 TO 65	87	30. 0	9	CUMULUS CLOUDING	62 TO 65	85	30. 1	10	78.0	1900
1003172007WC	HEAVY FOG	62 TO 65	87	30. 0	9	CUMULUS CLOUDING	62 TO 65	85	30. 1	10	75.7	1900
1003174008WC	STRATUS CLOUDING	66 TO 69	78	30. 2	9	CUMULUS CLOUDING	62 TO 65	85	30. 1	10	78.0	1600
1006172001WC	SIRUS CLOUDING	66 TO 69	55	30.10	10	SIRUS CLOUDING	70 TO 73	28	30. 6	10	89.6	25K
1006174602WC	SIRUS CLOUDING	66 TO 69	55	30.10	10	SIRUS CLOUDING	70 TO 73	28	30. 6	10	81.3	25K
1006181003WC	SIRUS CLOUDING	66 TO 69	55	30.10	10	SIRUS CLOUDING	70 TO 73	28	30. 6	10	74.7	25K
1006183204WC	SIRUS CLOUDING	62 TO 65	59	30.10	2	ALTO CUMULUS	62 TO 65	27	30. 4	10	88.2	25K
1006193605WC	SIRUS CLOUDING	62 TO 65	59	30.10	2	ALTO CUMULUS	62 TO 65	27	30. 4	10	76.7	25K
1006200006WC	SIRUS CLOUDING	62 TO 65	73	30.10	2	ALTO CUMULUS	62 TO 65	53	30.40	9	75.7	25K
1006202407WC	SIRUS CLOUDING	62 TO 65	73	30.10	2	ALTO CUMULUS	62 TO 65	53	30.40	9	76.1	25K
1006204608WC	SIRUS CLOUDING	62 TO 65	73	30.10	2	ALTO CUMULUS	62 TO 65	53	30.40	9	67.2	25K
1006210609WC	SIRUS CLOUDING	54 TO 57	87	30. 9	6	ALTO CUMULUS	62 TO 65	52	30. 4	7	69.0	25K
1006220010WC	SIRUS CLOUDING	54 TO 57	87	30. 9	6	ALTO CUMULUS	58 TO 61	60	30. 3	7	55.0	25K
1007102001WC	ALTO CUMULUS	58 TO 61	70	29.98	9	SIRUS CLOUDING	54 TO 57	68	29.27	14	77.7	12K
1007114002WC	ALTO CUMULUS	62 TO 65	70	29.98	9	SIRUS CLOUDING	66 TO 69	61	29.25	14	85.2	12K
1007123003WC	ALTO CUMULUS	62 TO 65	63	29.97	10	SIRUS CLOUDING	66 TO 69	61	29.25	14	85.7	12K
1007130004WC	ALTO CUMULUS	62 TO 65	63	29.97	10	RAIN, CUM CLOUD	66 TO 69	68	29.25	15	80.5	12K
1007132005WC	ALTO CUMULUS	62 TO 65	63	29.97	10	RAIN, CUM CLOUD	66 TO 69	68	29.25	15	80.1	12K
1007135006WC	ALTO CUMULUS	66 TO 69	63	29.94	10	RAIN, CUM CLOUD	66 TO 69	68	29.25	15	81.0	12K
1007145408WC	RAIN, CUM CLOUD	66 TO 69	66	29.94	10	RAIN, CUM CLOUD	66 TO 69	81	29.24	17	83.3	12K
1007152009WC	RAIN, CUM CLOUD	66 TO 69	66	29.94	10	RAIN, CUM CLOUD	66 TO 69	81	29.24	17	84.7	12K
1007154010WC	ALTO CUMULUS	62 TO 65	63	29.93	11	CUMULUS CLOUDING	62 TO 65	87	29.24	17	84.6	12K
1007160011WC	ALTO CUMULUS	62 TO 65	63	29.93	11	CUMULUS CLOUDING	62 TO 65	87	29.24	17	89.1	12K
1008110001WC	CLEAR	62 TO 65	63	29.99	10	ALTO CUMULUS	66 TO 69	63	29.28	26	73.2	5000
1008113002WC	CLEAR	62 TO 65	63	29.99	10	ALTO CUMULUS	66 TO 69	63	29.28	26	71.6	5000
1008115603WC	CLEAR	62 TO 65	63	29.99	10	ALTO CUMULUS	66 TO 69	63	29.28	26	72.6	5000
1008121004WC	CUMULUS CLOUDING	66 TO 69	38	29.94	17	ALTO CUMULUS	66 TO 69	63	29.28	26	72.7	5000
1008131005WC	CUMULUS CLOUDING	70 TO 73	38	29.94	17	ALTO CUMULUS	66 TO 69	63	29.28	26	80.0	5000
1008133406WC	CUMULUS CLOUDING	70 TO 73	38	29.94	17	CUMULUS CLOUDING	70 TO 73	48	29.24	25	80.1	5000
1008135407WC	CUMULUS CLOUDING	70 TO 73	38	29.94	17	CUMULUS CLOUDING	70 TO 73	48	29.24	25	75.4	5000
1008141408WC	CUMULUS CLOUDING	70 TO 73	38	29.94	17	CUMULUS CLOUDING	62 TO 65	48	29.29	20	73.3	5000
1008155009NC	CUMULUS CLOUDING	66 TO 69	32	29.93	20	CUMULUS CLOUDING	62 TO 65	42	29.25	20	99.6	5000
1008161010WC	CUMULUS CLOUDING	62 TO 65	54	29.92	24	CUMULUS CLOUDING	62 TO 65	42	29.25	20	77.3	5000
1008163211WC	CUMULUS CLOUDING	62 TO 65	54	29.92	24	CUMULUS CLOUDING	62 TO 65	42	29.25	20	92.2	5000
1009093201WC	CLEAR	50 TO 53	71	30.23	7	CLEAR	54 TO 57	57	29.52	14	82.2	
1009100002NC	CLEAR	50 TO 53	71	30.23	7	CLEAR	54 TO 57	57	29.52	14	68.1	
1009103003WC	CLEAR	54 TO 57	71	30.23	7	CLEAR	54 TO 57	57	29.52	14	83.5	
1009105604WC	CLEAR	58 TO 61	57	30.22	5	CLEAR	58 TO 61	55	29.52	11	82.0	
1009123005WC	CLEAR	62 TO 65	57	30.22	5	CLEAR	62 TO 65	56	29.50	11	72.9	
1009130006WC	CLEAR	62 TO 65	57	30.22	5	CLEAR	62 TO 65	50	29.50	11	74.7	
1009145007WC	CLEAR	66 TO 69	39	30.13	8	CLEAR	66 TO 69	46	29.48	10	73.0	
1009152008WC	CLEAR	66 TO 69	39	30.13	8	CLEAR	66 TO 69	46	29.48	10	73.7	
1009154009WC	CLEAR	66 TO 69	39	30.13	8	CLEAR	66 TO 69	46	29.48	10	73.3	
1009160010WC	CLEAR	66 TO 69	39	30.13	8	CLEAR	66 TO 69	46	29.48	10	75.0	

TEST	WEATHER	RECEIVE SITE TEMP DEGREES F.	REL HUM PERCENT	BARO PRES INCHES MERCURY	WIND SPEED KNOTS	WEATHER	TRANSMIT SITE TEMP DEGREES F.	REL HUM PERCENT	BARO PRES INCHES MERCURY	WIND SPEED KNOTS	SIGNAL STRG -DBM	CLOUD LEVEL FEET
1009185011WC	CLEAR	58 TO 61	45	30.16	3	CLEAR	58 TO 61	51	29.40	18	95.9	
1009191012WC	CLEAR	58 TO 61	45	30.16	3	CLEAR	58 TO 61	51	29.40	18	79.6	
1009195013WC	CLEAR	50 TO 53	45	30.16	3	CLEAR	58 TO 61	51	29.40	18	76.6	
1009201414WC	CLEAR	54 TO 57	74	30.16	2	CLEAR	54 TO 57	64	29.39	18	71.4	
1009212015WC	CLEAR	50 TO 53	86	30.16	0	CLEAR	50 TO 53	74	29.39	18	62.1	
1009214016WC	CLEAR	50 TO 53	86	30.16	0	CLEAR	50 TO 53	74	25.39	18	61.8	
1009220017WC	CLEAR	46 TO 49	86	30.16	0	CLEAR	54 TO 57	71	29.39	17	72.9	
1013172501WC	STRUS CLOUDING	74 TO 77	60	29.73	20	ALTO CUMULUS	78 TO 81	54	29. 8	25	83.5	
1013174502WC	STRUS CLOUDING	74 TO 77	60	29.73	20	ALTO CUMULUS	78 TO 81	54	29. 6	25	84.6	
1013181003WC	STRATUS CLOUDING	78 TO 81	60	29.73	20	ALTO CUMULUS	78 TO 81	60	29. 5	25	85.4	
1013183504WC	STRUS CLOUDING	74 TO 77	60	29.73	20	ALTO CUMULUS	74 TO 77	60	29. 5	25	87.5	
1013194505WC	STRUS CLOUDING	78 TO 81	60	29.73	20	ALTO CUMULUS	74 TO 77	60	29. 5	25	88.2	
1013201206WC	STRUS CLOUDING	78 TO 81	60	29.73	20	ALTO CUMULUS	74 TO 77	60	29. 5	25	86.6	
1013203507WC	STRUS CLOUDING	74 TO 77	62	29.76	20	ALTO CUMULUS	74 TO 77	60	29. 5	25	87.0	
1013210008WC	STRUS CLOUDING	74 TO 77	62	29.76	20	ALTO CUMULUS	74 TO 77	60	29. 5	25	87.0	
1013221009WC	STRUS CLOUDING	74 TO 77	62	29.76	20	ALTO CUMULUS	74 TO 77	60	29. 5	25	100.1	
1013223010WC	STRUS CLOUDING	74 TO 77	57	29.69	25	ALTO CUMULUS	74 TO 77	60	29. 1	20	85.4	
1013225011WC	STRUS CLOUDING	74 TO 77	57	29.69	25	CUMULUS CLOUDING	70 TO 73	76	29. 1	16	82.1	
1013231012WC	STRUS CLOUDING	70 TO 73	59	29.67	40	CUMULUS CLOUDING	70 TO 73	76	29. 1	16	80.6	
1014105801WC	CUMULUS CLOUDING	50 TO 53	61	30. 6	15	CUMULUS CLOUDING	50 TO 53	51	29.36	24	98.5	
1014112502WC	CUMULUS CLOUDING	50 TO 53	61	30. 6	15	CUMULUS CLOUDING	50 TO 53	51	29.36	24	86.9	
1014114503WC	CUMULUS CLOUDING	50 TO 53	61	30. 7	15	CUMULUS CLOUDING	50 TO 53	51	29.36	24	81.5	
1014120504WC	CUMULUS CLOUDING	50 TO 53	61	30. 7	13	CUMULUS CLOUDING	50 TO 53	51	29.36	24	80.7	
1014153005WC	CUMULUS CLOUDING	50 TO 53	54	30. 2	15	CUMULUS CLOUDING	50 TO 53	47	29.39	15	78.8	3800
1014155006WC	CUMULUS CLOUDING	50 TO 53	54	30. 2	15	CUMULUS CLOUDING	50 TO 53	47	29.39	15	80.7	3800
1014161207WC	CUMULUS CLOUDING	50 TO 53	54	30. 2	15	CUMULUS CLOUDING	50 TO 53	47	29.39	15	83.6	3800
1014163208WC	CUMULUS CLOUDING	50 TO 53	50	30. 4	18	CUMULUS CLOUDING	50 TO 53	50	29.39	18	84.9	3800
1015090001WC	CLEAR	34 TO 37	85	30.19	5	CLEAR	42 TO 45	73	29.54	3	87.5	
1015092002WC	CLEAR	42 TO 45	85	30.19	5	CLEAR	42 TO 45	73	29.54	3	85.7	
1015095603WC	CLEAR	42 TO 45	85	30.19	5	CLEAR	42 TO 45	73	29.54	3	86.2	
1015101604WC	CLEAR	46 TO 49	65	30.21	5	CUMULUS CLOUDING	54 TO 57	48	29.55	3	79.9	
1015120006WC	CUMULUS CLOUDING	54 TO 57	56	30.21	7	CUMULUS CLOUDING	54 TO 57	43	29.55	5	106.0	3000
1015124408WC	CUMULUS CLOUDING	50 TO 53	50	30.21	11	CUMULUS CLOUDING	54 TO 57	43	29.55	5	83.6	3000
1016124001WC	STRATUS CLOUDING	50 TO 53	77	29.70	14	RAIN, STAT CLOUD	54 TO 57	86	29.66	13	101.3	3000
1016130602WC	STRATUS CLOUDING	50 TO 53	77	29.70	14	STRATUS CLOUDING	58 TO 61	84	29. 4	20	88.9	3000
1016133203WC	RAIN, STAT CLOUD	50 TO 53	77	29.76	14	STRATUS CLOUDING	58 TO 61	84	29. 4	20	85.0	3000
1016140004WC	CUMULUS CLOUDING	54 TO 57	69	29.74	18	CUMULUS CLOUDING	54 TO 57	84	29. 3	20	82.2	3000
1016152005WC	CUMULUS CLOUDING	54 TO 57	69	29.72	17	RAIN, CUM CLOUD	54 TO 57	69	29.66	12	79.3	1000
1016154606WC	CUMULUS CLOUDING	58 TO 61	69	29.72	17	RAIN, CUM CLOUD	54 TO 57	69	29.66	12	78.8	1000
1016164008WC	CUMULUS CLOUDING	54 TO 57	72	29.72	14	RAIN, CUM CLOUD	58 TO 61	69	29.66	14	84.0	3000
1016170809WC	RAIN, CUM CLOUD	54 TO 57	82	29.73	10	RAIN, CUM CLOUD	58 TO 61	69	29.71	17	83.3	4500
1017060001WC	CUMULUS CLOUDING	46 TO 49	71	29.82	10	CUMULUS CLOUDING	46 TO 49	36	29.77	14	85.6	5000
1017064002WC	CUMULUS CLOUDING	46 TO 49	71	29.82	10	CUMULUS CLOUDING	46 TO 49	36	29.77	14	86.2	5000
1017070003WC	ALTO CUMULUS	46 TO 49	71	29.77	14	ALTO CUMULUS	46 TO 49	65	29.82	8	87.1	7000
1017075605WC	ALTO CUMULUS	46 TO 49	71	29.77	14	ALTO CUMULUS	46 TO 49	65	29.82	8	86.4	7000
1017112006WC	CUMULUS CLOUDING	46 TO 49	71	29.77	14	ALTO CUMULUS	50 TO 53	65	29.82	8	78.6	7000
1017114607WC	CUMULUS CLOUDING	46 TO 49	68	29.86	14	ALTO CUMULUS	50 TO 53	61	29.86	24	80.6	3000
1017120608WC	RAIN, CUM CLOUD	50 TO 53	68	29.86	14	ALTO CUMULUS	50 TO 53	61	29.86	24	80.0	3000
1020103201WC	RAIN, CUM CLOUD	50 TO 53	68	29.86	14	ALTO CUMULUS	50 TO 53	61	29.86	24	97.4	3000
1020110602WC	CUMULUS CLOUDING	58 TO 61	81	29.70	20	CUMULUS CLOUDING	58 TO 61	90	29.71	21	81.2	7000
1020113603WC	CUMULUS CLOUDING	58 TO 61	81	29.70	20	CUMULUS CLOUDING	58 TO 61	90	29.71	21	76.1	7000
1020120004WC	CUMULUS CLOUDING	58 TO 61	73	29.74	12	RAIN, CUM CLOUD	62 TO 65	81	29.70	12	78.0	3300
1020123205WC	CUMULUS CLOUDING	58 TO 61	73	29.74	12	RAIN, CUM CLOUD	62 TO 65	81	29.70	12	79.0	3300
1020153206WC	CUMULUS CLOUDING	66 TO 69	71	29.64	23	RAIN, CUM CLOUD	62 TO 65	84	29.63	25	101.6	3300
1020162007WC	RAIN, CUM CLOUD	62 TO 65	78	29.65	25	RAIN, CUM CLOUD	62 TO 65	84	29.64	29	87.1	1800

TEST	RECEIVE SITE WEATHER	RECEIVE SITE TEMP DEGREES F.	RECEIVE SITE REL HUM PERCENT	RECEIVE SITE BARO PRES INCHES MERCURY	RECEIVE SITE WIND SPEED KNOTS	TRANSMIT SITE WEATHER	TRANSMIT SITE TEMP DEGREES F.	TRANSMIT SITE REL HUM PERCENT	TRANSMIT SITE BARO PRES INCHES MERCURY	TRANSMIT SITE WIND SPEED KNOTS	SIGNAL STRG -DBM	CLOUD LEVEL FEET
1021043001NC	RAIN, CUM CLOUD	50 TO 53	89	29.62	9	CUMULUS CLOUDING	50 TO 53	83	29.63	14	99.0	1800
1021045602WC	RAIN, CUM CLOUD	50 TO 53	89	29.62	9	CUMULUS CLOUDING	50 TO 53	83	29.63	14	81.3	1800
1021052203WC	CUMULUS CLOUDING	46 TO 49	89	29.62	9	CUMULUS CLOUDING	50 TO 53	83	29.63	14	84.0	2800
1021055004WC	CUMULUS CLOUDING	46 TO 49	89	29.62	9	CUMULUS CLOUDING	50 TO 53	83	29.63	14	84.9	2800
1021061605WC	CUMULUS CLOUDING	46 TO 49	89	29.69	8	CUMULUS CLOUDING	50 TO 53	78	29.70	14	84.8	1500
1021071206WC	CUMULUS CLOUDING	46 TO 49	86	29.72	10	CUMULUS CLOUDING	50 TO 53	84	29.71	10	82.3	2800
1021074607WC	CUMULUS CLOUDING	46 TO 49	86	29.72	10	CUMULUS CLOUDING	50 TO 53	84	29.71	10	85.7	2800
1021082008WC	CUMULUS CLOUDING	42 TO 45	89	29.72	7	CUMULUS CLOUDING	46 TO 49	89	29.70	10	80.0	3300
1021084009WC	CUMULUS CLOUDING	42 TO 45	89	29.72	7	CUMULUS CLOUDING	46 TO 49	89	29.70	10	81.9	3300
1021090010WC	CUMULUS CLOUDING	46 TO 49	86	29.77	7	CUMULUS CLOUDING	46 TO 49	86	29.72	11	83.7	2300
1022101502WC	LIGHT SNOW	34 TO 37	89	29.86	12	CUMULUS CLOUDING	34 TO 37	80	29.82	15	94.9	600
1022122003WC	LIGHT SNOW	34 TO 37	89	29.89	12	CUMULUS CLOUDING	34 TO 37	73	29.87	14	83.8	1500
1022124004WC	LIGHT SNOW	34 TO 37	89	29.89	12	CUMULUS CLOUDING	34 TO 37	73	29.87	14	82.2	1500
1022130005WC	CUMULUS CLOUDING	34 TO 37	82	29.91	10	LIGHT SNOW	38 TO 41	64	29.26	14	81.9	1300
1022132406WC	CUMULUS CLOUDING	34 TO 37	82	29.91	10	LIGHT SNOW	38 TO 41	64	29.26	14	78.5	1300
1022134407WC	CUMULUS CLOUDING	34 TO 37	82	29.91	10	LIGHT SNOW	38 TO 41	64	29.26	14	79.1	1300
1022140008WC	LIGHT SNOW	38 TO 41	79	29.92	15	CUMULUS CLOUDING	34 TO 37	64	29.90	15	81.1	1300
1023101401NC	LIGHT SNOW	34 TO 37	54	29.77	17	CUMULUS CLOUDING	34 TO 37	54	29.77	11	95.4	3800
1023104602WC	CUMULUS CLOUDING	34 TO 37	45	30.46	11	CUMULUS CLOUDING	34 TO 37	54	30.45	13	80.7	3800
1023114603WC	CUMULUS CLOUDING	34 TO 37	42	30.48	12	CUMULUS CLOUDING	34 TO 37	54	30.47	14	87.6	4000
1023120804WC	CUMULUS CLOUDING	34 TO 37	42	30.48	12	CUMULUS CLOUDING	34 TO 37	54	30.47	14	87.6	4000
1023125605WC	CUMULUS CLOUDING	34 TO 37	40	30.49	15	CUMULUS CLOUDING	34 TO 37	54	30.45	13	83.7	4000
1023132006WC	CUMULUS CLOUDING	34 TO 37	40	30.49	15	CUMULUS CLOUDING	34 TO 37	54	30.45	13	83.0	4000
1023134607WC	CUMULUS CLOUDING	34 TO 37	45	30.52	13	CUMULUS CLOUDING	34 TO 37	54	30.46	13	82.8	4000
1023143408WC	CUMULUS CLOUDING	34 TO 37	45	30.52	13	CUMULUS CLOUDING	34 TO 37	54	30.46	13	82.5	4000

TEST RECORD
WHITFORD FIELD, NOVEMBER

X-BAND

TEST	RECEIVE SITE WEATHER	RECEIVE SITE TEMP DEGREES F.	RECEIVE SITE REL HUM PERCENT	RECEIVE SITE BARO PRES INCHES MERCURY	RECEIVE SITE WIND SPEED KNOTS	TRANSMIT SITE WEATHER	TRANSMIT SITE TEMP DEGREES F.	TRANSMIT SITE REL HUM PERCENT	TRANSMIT SITE BARO PRES INCHES MERCURY	TRANSMIT SITE WIND SPEED KNOTS	SIGNAL STRG -DBM	CLOUD LEVEL FEET
1031144001WX	STRUS CLOUDING	58 TO 61	42	30.27	14	SIRUS CLOUDING	62 TO 65	42	30.18	9	102.2	20K
1031150002WX	STRUS CLOUDING	54 TO 57	42	30.33	14	SIRUS CLOUDING	62 TO 65	42	30.18	8	99.7	20K
1031154003WX	STRUS CLOUDING	54 TO 57	42	30.33	14	SIRUS CLOUDING	62 TO 65	42	30.18	8	101.7	20K
1031160004WX	STRUS CLOUDING	54 TO 57	41	30.35	15	SIRUS CLOUDING	58 TO 61	41	30.16	3	102.4	20K
1031163205WX	STRUS CLOUDING	54 TO 57	41	30.32	15	SIRUS CLOUDING	58 TO 61	41	30.16	3	98.4	20K
1031170006WX	STRUS CLOUDING	54 TO 57	41	30.32	15	SIRUS CLOUDING	54 TO 57	41	30.16	3	96.6	20K
1103213201WX	RAIN, CUM CLOUD	50 TO 53	86	29.92	0	RAIN, CUM CLOUD	50 TO 53	86	29.90	8	95.3	3200
1103215602WX	RAIN, CUM CLOUD	50 TO 53	89	29.96	0	RAIN, CUM CLOUD	50 TO 53	89	29.90	10	97.6	1400
1103223003WX	RAIN, CUM CLOUD	50 TO 53	89	29.96	0	RAIN, CUM CLOUD	50 TO 53	89	29.90	10	102.6	1400
1103233004WX	CUMULUS CLOUDING	46 TO 49	89	29.82	10	CUMULUS CLOUDING	50 TO 53	89	29.85	7	100.7	1200
1106110001WX	RAIN, CUM CLOUD	38 TO 41	89	29.72	13	RAIN, CUM CLOUD	46 TO 49	89	29.53	11	95.0	3500
1106114002WX	CUMULUS CLOUDING	50 TO 53	82	29.56	14	RAIN, CUM CLOUD	42 TO 45	82	29.76	10	93.9	3000
1106133003WX	CUMULUS CLOUDING	50 TO 53	82	29.56	14	RAIN, CUM CLOUD	42 TO 45	82	29.76	10	98.1	3000
1106140004WX	CUMULUS CLOUDING	50 TO 53	76	29.58	9	RAIN, CUM CLOUD	42 TO 45	76	29.77	11	97.6	3000
1106144805WX	CUMULUS CLOUDING	38 TO 41	82	29.61	17	RAIN, CUM CLOUD	42 TO 45	82	29.78	12	98.5	3000
1106151206WX	CUMULUS CLOUDING	38 TO 41	82	29.61	17	RAIN, CUM CLOUD	42 TO 45	82	29.78	12	98.1	3000
1106154807WX	CUMULUS CLOUDING	46 TO 49	82	29.64	12	CUMULUS CLOUDING	42 TO 45	82	29.81	12	97.2	3000
1106162408WX	CUMULUS CLOUDING	46 TO 49	82	29.64	12	CUMULUS CLOUDING	42 TO 45	82	29.81	12	95.7	3000
1106165609WX	CUMULUS CLOUDING	46 TO 49	79	29.67	13	CUMULUS CLOUDING	42 TO 45	79	29.80	11	97.0	5500
1106172010WX	CUMULUS CLOUDING	46 TO 49	79	29.67	13	CUMULUS CLOUDING	42 TO 45	79	29.80	11	96.3	5500
1106175211WX	CUMULUS CLOUDING	46 TO 49	79	29.67	13	CUMULUS CLOUDING	42 TO 45	79	29.80	11	96.2	5500
1106182412WX	CUMULUS CLOUDING	42 TO 45	82	29.72	7	CUMULUS CLOUDING	42 TO 45	82	29.86	8	99.2	5500
1106190013WX	CUMULUS CLOUDING	42 TO 45	82	29.75	9	CUMULUS CLOUDING	42 TO 45	82	29.85	8	102.2	5500
1106193614WX	CUMULUS CLOUDING	42 TO 45	82	29.75	9	CUMULUS CLOUDING	42 TO 45	82	29.85	8	99.7	5500
1106205015WX	CUMULUS CLOUDING	42 TO 45	82	29.74	8	CUMULUS CLOUDING	42 TO 45	82	29.88	6	102.0	4500
1106214816WX	CUMULUS CLOUDING	42 TO 45	82	29.74	8	CUMULUS CLOUDING	42 TO 45	82	29.88	6	95.8	4500
1106223017WX	CUMULUS CLOUDING	42 TO 45	86	29.74	9	CUMULUS CLOUDING	42 TO 45	86	29.87	8	98.0	4500
1106224618WX	CUMULUS CLOUDING	42 TO 45	86	29.70	7	CUMULUS CLOUDING	42 TO 45	86	29.88	11	97.6	5000
1106232419WX	CUMULUS CLOUDING	38 TO 41	86	29.70	7	CUMULUS CLOUDING	34 TO 37	86	29.88	11	95.1	5000
1110125001WX	STRATUS CLOUDING	50 TO 53	89	29.91	7	STRATUS CLOUDING	42 TO 45	89	29.91	6	99.2	300
1110130002WX	STRATUS CLOUDING	50 TO 53	89	29.91	7	STRATUS CLOUDING	42 TO 45	89	29.91	6	99.3	300
1110145803WX	RAIN, STAT CLOUD	42 TO 45	93	29.91	7	RAIN, STAT CLOUD	50 TO 53	93	29.91	4	94.2	700
1110151004WX	RAIN, STAT CLOUD	42 TO 45	93	29.91	7	RAIN, STAT CLOUD	50 TO 53	93	29.91	4	94.9	700
1110162005WX	LIGHT FOG	42 TO 45	93	29.91	10	STRATUS CLOUDING	50 TO 53	93	29.91	5	97.9	1000
1110163406WX	LIGHT FOG	42 TO 45	93	29.91	10	STRATUS CLOUDING	50 TO 53	93	29.91	5	96.2	1000
1110164807WX	LIGHT FOG	42 TO 45	93	29.91	10	STRATUS CLOUDING	50 TO 53	93	29.91	5	94.7	1000
1112132401WX	STRATUS CLOUDING	50 TO 53	89	29.46	5	STRATUS CLOUDING	50 TO 53	80	29.44	13	97.7	2800
1112133802WX	STRATUS CLOUDING	50 TO 53	89	29.46	5	STRATUS CLOUDING	50 TO 53	89	29.44	13	97.0	2800
1112140803WX	RAIN, STAT CLOUD	50 TO 53	80	29.46	10	STRATUS CLOUDING	50 TO 53	80	29.45	14	98.7	2800
1112143604WX	RAIN, STAT CLOUD	50 TO 53	80	29.46	10	STRATUS CLOUDING	50 TO 53	80	29.45	14	98.6	2800
1112151005WX	RAIN, STAT CLOUD	50 TO 53	77	29.45	5	STRATUS CLOUDING	50 TO 53	77	29.47	15	92.4	2800
1112153206WX	RAIN, STAT CLOUD	50 TO 53	77	29.45	5	STRATUS CLOUDING	50 TO 53	77	29.47	15	93.2	2800
1112154807WX	STRATUS CLOUDING	50 TO 53	80	29.44	6	STRATUS CLOUDING	46 TO 49	80	29.50	15	95.5	5500
1113094001WX	ALTO CUMULUS	42 TO 45	79	29.60	10	ALTO CUMULUS	42 TO 45	79	29.65	12	112.6	10K
1113095602WX	CUMULUS CLOUDING	42 TO 45	70	29.64	14	CUMULUS CLOUDING	42 TO 45	70	29.70	9	112.9	8000
1113110004WX	ALTO CUMULUS	46 TO 49	67	29.7[illegible]	12	ALTO CUMULUS	46 TO 49	67	29.66	14	97.1	8000
1113114005WX	ALTO CUMULUS	46 TO 49	67	29.7[illegible]	12	ALTO CUMULUS	46 TO 49	67	29.66	14	101.9	8000

TEST	RECEIVE SITE WEATHER	RECEIVE SITE TEMP DEGREES F.	RECEIVE SITE REL HUM PERCENT	RECEIVE SITE BARO PRES INCHES MERCURY	RECEIVE SITE WIND SPEED KNOTS	TRANSMIT SITE WEATHER	TRANSMIT SITE TEMP DEGREES F.	TRANSMIT SITE REL HUM PERCENT	TRANSMIT SITE BARO PRES INCHES MERCURY	TRANSMIT SITE WIND SPEED KNOTS	SIGNAL STRG −DBM	CLOUD LEVEL FEET
1113124006WX	ALTO CUMULUS	42 TO 45	67	29.68	9	ALTO CUMULUS	46 TO 49	67	29.70	13	105.4	2500
1114141605WX	CUMULUS CLOUDING	42 TO 45	89	29.37	8	LIGHT SNOW	38 TO 41	89	29.36	11	95.8	1600
1114144606WX	CUMULUS CLOUDING	42 TO 45	89	29.37	8	LIGHT SNOW	38 TO 41	89	29.36	11	93.1	1600
1114153407WX	RAIN, CUM CLOUD	38 TO 41	89	29.36	12	LIGHT SNOW	38 TO 41	89	29.35	12	100.5	1600
1114170009WX	RAIN, CUM CLOUD	38 TO 41	92	29.32	9	RAIN, CUM CLOUD	38 TO 41	92	29.37	11	96.7	1600
1117112001WX	ALTO CUMULUS	46 TO 49	45	30.48	9	ALTO CUMULUS	46 TO 49	45	30.29	18	96.4	15K
1117120003WX	ALTO CUMULUS	46 TO 49	48	30.46	8	ALTO CUMULUS	46 TO 49	48	30.27	15	94.2	1500
1117122004WX	ALTO CUMULUS	46 TO 49	48	30.46	8	ALTO CUMULUS	46 TO 49	48	30.27	15	94.0	1500
1117124005WX	ALTO CUMULUS	46 TO 49	48	30.46	8	ALTO CUMULUS	46 TO 49	48	30.27	15	94.2	1500
1117140006WX	STRUS CLOUDING	50 TO 53	48	30.46	13	SIRUS CLOUDING	46 TO 49	48	30.22	15	98.1	20K
1117141607WX	STRUS CLOUDING	50 TO 53	48	30.46	13	SIRUS CLOUDING	46 TO 49	48	30.22	15	97.1	20K
1117143208WX	STRUS CLOUDING	50 TO 53	48	30.46	13	SIRUS CLOUDING	46 TO 49	48	30.22	15	99.1	20K
1117144809WX	STRUS CLOUDING	50 TO 53	48	30.45	13	SIRUS CLOUDING	46 TO 49	48	30.22	15	100.8	20K
1117151810WX	STRUS CLOUDING	50 TO 53	46	30.46	10	SIRUS CLOUDING	50 TO 53	51	30.20	15	101.6	12K
1117160811WX	STRUS CLOUDING	50 TO 53	48	30.39	10	SIRUS CLOUDING	46 TO 49	48	30.20	11	102.7	12K
1117162612WX	STRUS CLOUDING	50 TO 53	48	30.39	10	SIRUS CLOUDING	46 TO 49	48	30.20	11	102.6	12K
1119103401WX	ALTO CUMULUS	58 TO 61	64	29.92	20	RAIN, CUM CLOUD	58 TO 61	64	29.69	23	101.5	8000
1119111803WX	ALTO CUMULUS	58 TO 61	64	29.86	24	RAIN, CUM CLOUD	58 TO 61	64	29.51	30	95.7	8000
1119133004WX	RAIN, CUM CLOUD	58 TO 61	67	29.74	18	RAIN, CUM CLOUD	58 TO 61	67	29.37	40	102.3	3200
1119160005WX	CUMULUS CLOUDING	58 TO 61	82	29.65	20	LIGHT SNOW	38 TO 41	82	29.72	22	97.9	8000
1120113001WX	LIGHT SNOW	30 TO 33	75	29.96	8	LIGHT SNOW	26 TO 29	75	29.96	18	108.1	2500
1120133802WX	CUMULUS CLOUDING	34 TO 37	69	29.95	20	CUMULUS CLOUDING	30 TO 33	69	29.99	20	112.0	2500
1120135003WX	CUMULUS CLOUDING	30 TO 33	66	29.94	14	CUMULUS CLOUDING	34 TO 37	66	29.99	20	112.0	2500
1120143604WX	CUMULUS CLOUDING	30 TO 33	66	29.94	14	CUMULUS CLOUDING	34 TO 37	66	29.99	20	100.3	2500
1120152005WX	LIGHT SNOW	30 TO 33	75	29.97	14	LIGHT SNOW	30 TO 33	75	30. 1	17	96.7	2500
1120164606WX	LIGHT SNOW	30 TO 33	59	29.97	13	LIGHT SNOW	30 TO 33	59	30. 4	19	101.5	2500
1120170407WX	HEAVY SNOW	30 TO 33	58	29.99	16	CUMULUS CLOUDING	30 TO 33	58	30. 6	14	101.4	2500
1120202608WX	HEAVY SNOW	26 TO 29	75	30. 7	14	HEAVY SNOW	30 TO 33	75	30.11	18	104.5	2000
1120204509WX	HEAVY SNOW	26 TO 29	75	30. 7	14	HEAVY SNOW	30 TO 33	75	30.11	19	106.5	2000
1120211410WX	HEAVY SNOW	26 TO 29	81	30. 8	13	HEAVY SNOW	26 TO 29	81	30.12	20	107.1	2000

TEST RECORD
WHITFORD FIELD, NOVEMBER

C-BAND

TEST	WEATHER	RECEIVE SITE TEMP DEGREES F.	REL HUM PERCENT	BARO PRES INCHES MERCURY	WIND SPEED KNOTS	WEATHER	TRANSMIT SITE TEMP DEGREES F.	REL HUM PERCENT	BARO PRES INCHES MERCURY	WIND SPEED KNOTS	SIGNAL STRG - DBM	CLOUD LEVEL FEET
1031144001WC	SIRUS CLOUDING	58 TO 61	42	30.27	14	SIRUS CLOUDING	62 TO 65	42	30.18	9	94.9	20K
1031150002WC	SIRUS CLOUDING	54 TO 57	42	30.33	14	SIRUS CLOUDING	62 TO 65	42	30.18	8	92.4	20K
1031154003WC	SIRUS CLOUDING	54 TO 57	42	30.33	14	SIRUS CLOUDING	62 TO 65	42	30.18	8	94.7	20K
1031160004WC	SIRUS CLOUDING	54 TO 57	41	30.32	15	SIRUS CLOUDING	58 TO 61	41	30.16	3	96.1	20K
1031163205WC	SIRUS CLOUDING	54 TO 57	41	30.32	15	SIRUS CLOUDING	58 TO 61	41	30.16	3	93.0	20K
1031170006WC	SIRUS CLOUDING	54 TO 57	41	30.32	15	SIRUS CLOUDING	54 TO 57	41	30.16	3	96.3	20K
1103213201WC	RAIN, CUM CLOUD	50 TO 53	86	29.92	0	RAIN, CUM CLOUD	50 TO 53	86	29.90	8	91.5	3200
1103215602WC	RAIN, CUM CLOUD	50 TO 53	89	29.96	0	RAIN, CUM CLOUD	50 TO 53	89	29.90	10	93.2	1400
1103223003WC	RAIN, CUM CLOUD	50 TO 53	89	29.96	0	RAIN, CUM CLOUD	50 TO 53	89	29.90	10	92.4	1400
1103233004WC	CUMULUS CLOUDING	46 TO 49	89	29.80	10	CUMULUS CLOUDING	50 TO 53	89	29.85	7	95.3	1200
1106114002WC	CUMULUS CLOUDING	50 TO 53	82	29.56	14	RAIN, CUM CLOUD	42 TO 45	82	29.76	10	89.2	3000
1106140004WC	CUMULUS CLOUDING	50 TO 53	76	29.58	9	RAIN, CUM CLOUD	42 TO 45	76	29.77	11	93.9	3000
1106151206WC	CUMULUS CLOUDING	38 TO 41	82	29.61	17	RAIN, CUM CLOUD	42 TO 45	82	29.78	12	94.2	3000
1106151807WC	CUMULUS CLOUDING	46 TO 49	82	29.64	12	CUMULUS CLOUDING	42 TO 45	82	29.81	12	93.0	3000
1106162408WC	CUMULUS CLOUDING	46 TO 49	82	29.64	12	CUMULUS CLOUDING	42 TO 45	82	29.81	12	91.8	3000
1106165609WC	CUMULUS CLOUDING	46 TO 49	79	29.67	13	CUMULUS CLOUDING	42 TO 45	79	29.80	11	92.5	5500
1106172010WC	CUMULUS CLOUDING	46 TO 49	79	29.67	13	CUMULUS CLOUDING	42 TO 45	79	29.80	11	91.8	5500
1106190013WC	CUMULUS CLOUDING	42 TO 45	82	29.75	9	CUMULUS CLOUDING	42 TO 45	82	29.85	8	97.4	5500
1106193014WC	CUMULUS CLOUDING	42 TO 45	82	29.75	9	CUMULUS CLOUDING	42 TO 45	82	29.85	8	96.4	5500
1106205015WC	CUMULUS CLOUDING	42 TO 45	82	29.74	8	CUMULUS CLOUDING	42 TO 45	82	29.88	6	113.3	4500
1106214816WC	CUMULUS CLOUDING	42 TO 45	82	29.74	8	CUMULUS CLOUDING	42 TO 45	82	29.88	6	107.6	4500
1106223017WC	CUMULUS CLOUDING	42 TO 45	86	29.74	9	CUMULUS CLOUDING	42 TO 45	86	29.87	8	109.8	4500
1106224618WC	CUMULUS CLOUDING	42 TO 45	86	29.70	7	CUMULUS CLOUDING	42 TO 45	84	29.88	11	110.0	5000
1106232419WC	CUMULUS CLOUDING	38 TO 41	86	29.70	7	CUMULUS CLOUDING	34 TO 37	84	29.88	11	105.4	5000
1110125001WC	STRATUS CLOUDING	50 TO 53	89	29.91	7	STRATUS CLOUDING	42 TO 45	89	29.91	6	93.4	300
1110130002WC	STRATUS CLOUDING	50 TO 53	89	29.91	7	STRATUS CLOUDING	42 TO 45	89	29.91	6	93.4	300
1110145803WC	RAIN, STAT CLOUD	42 TO 45	93	29.91	7	RAIN, STAT CLOUD	50 TO 53	93	29.91	4	90.6	700
1110151004WC	RAIN, STAT CLOUD	42 TO 45	93	29.91	7	RAIN, STAT CLOUD	50 TO 53	93	29.91	4	90.2	700
1110162005WC	LIGHT FOG	42 TO 45	93	29.91	10	STRATUS CLOUDING	50 TO 53	93	29.91	5	89.0	1000
1110163406WC	LIGHT FOG	42 TO 45	93	29.91	10	STRATUS CLOUDING	50 TO 53	93	29.91	5	88.7	1000
1110164807WC	LIGHT FOG	42 TO 45	93	29.91	10	STRATUS CLOUDING	50 TO 53	93	29.91	5	88.6	1000
1112132401WC	STRATUS CLOUDING	50 TO 53	89	29.45	5	STRATUS CLOUDING	50 TO 53	89	29.44	13	94.7	2800
1112143604WC	RAIN, STAT CLOUD	50 TO 53	80	29.45	10	STRATUS CLOUDING	50 TO 53	80	29.45	14	92.9	2800
1112151005WC	RAIN, STAT CLOUD	50 TO 53	77	29.45	5	STRATUS CLOUDING	50 TO 53	77	29.47	15	88.2	2500
1112153006WC	RAIN, STAT CLOUD	50 TO 53	77	29.45	5	STRATUS CLOUDING	50 TO 53	77	29.47	15	88.0	2500
1112154807WC	STRATUS CLOUDING	50 TO 53	80	29.44	6	STRATUS CLOUDING	50 TO 53	80	29.50	15	91.8	5500
1113094001WC	ALTO CUMULUS	42 TO 45	79	29.60	10	ALTO CUMULUS	42 TO 45	79	29.65	12	96.8	10K
1113095602WC	CUMULUS CLOUDING	42 TO 45	70	29.64	14	CUMULUS CLOUDING	42 TO 45	70	29.70	9	99.5	8000
1114141605WC	CUMULUS CLOUDING	42 TO 45	67	29.68	9	LIGHT SNOW	38 TO 41	67	29.70	13	113.5	2500
1114144606WC	CUMULUS CLOUDING	42 TO 45	67	29.68	9	LIGHT SNOW	38 TO 41	67	29.70	13	110.7	2500
1114164608WC	CUMULUS CLOUDING	38 TO 41	89	29.33	8	RAIN, CUM CLOUD	38 TO 41	89	29.35	12	91.8	1900
1114170009WC	RAIN, CUM CLOUD	38 TO 41	92	29.32	9	RAIN, CUM CLOUD	38 TO 41	92	29.37	11	95.6	1600
1117112001WC	ALTO CUMULUS	46 TO 49	45	30.48	9	ALTO CUMULUS	46 TO 49	45	30.29	18	92.5	15K
1117114002WC	ALTO CUMULUS	46 TO 49	45	30.48	9	ALTO CUMULUS	46 TO 49	45	30.29	18	90.5	15K
1117120003WC	ALTO CUMULUS	46 TO 49	48	30.44	8	ALTO CUMULUS	46 TO 49	48	30.27	15	91.2	1500
1117122004WC	ALTO CUMULUS	46 TO 49	48	30.44	8	ALTO CUMULUS	46 TO 49	44	30.27	15	89.9	1500
1117140006WC	SIRUS CLOUDING	50 TO 53	48	30.43	13	SIRUS CLOUDING	46 TO 49	44	30.22	15	91.8	20K

TEST	WEATHER	RECEIVE SITE TEMP DEGREES F.	REL HUM PERCENT	BARO PRES INCHES MERCURY	WIND SPEED KNOTS	WEATHER	TRANSMIT SITE TEMP DEGREES F.	REL HUM PERCENT	BARO PRES INCHES MERCURY	WIND SPEED KNOTS	SIGNAL STRG -DBM	CLOUD LEVEL FEET
1117141407WC	SIRUS CLOUDING	50 TO 53	48	30.40	13	SIRUS CLOUDING	46 TO 49	48	30.22	15	91.2	20K
1117143208WC	SIRUS CLOUDING	50 TO 53	48	30.43	13	SIRUS CLOUDING	46 TO 49	48	30.22	15	93.6	20K
1117151810WC	SIRUS CLOUDING	50 TO 53	46	30.43	10	SIRUS CLOUDING	50 TO 53	51	30.20	15	96.4	12K
1117162612WC	SIRUS CLOUDING	50 TO 53	48	30.38	10	SIRUS CLOUDING	46 TO 49	48	30.20	11	107.8	12K
1119103401WC	ALTO CUMULUS	58 TO 61	64	29.92	20	RAIN, CUM CLOUD	58 TO 61	64	29.69	23	100.2	8000
1119111903WC	ALTO CUMULUS	58 TO 61	64	29.86	24	RAIN, CUM CLOUD	58 TO 61	64	29.51	30	94.7	8000
1119133004WC	RAIN, CUM CLOUD	58 TO 61	67	29.74	18	RAIN, CUM CLOUD	58 TO 61	67	29.37	40	101.2	3200
1119160005WC	CUMULUS CLOUDING	58 TO 61	82	29.63	20	LIGHT SNOW	38 TO 41	82	29.72	22	112.4	8000
1120133802WC	CUMULUS CLOUDING	34 TO 37	69	29.97	20	CUMULUS CLOUDING	30 TO 33	69	29.99	20	119.4	2500
1120135003WC	CUMULUS CLOUDING	30 TO 33	66	29.94	14	CUMULUS CLOUDING	34 TO 37	66	29.99	20	118.9	2500
1120143604WC	CUMULUS CLOUDING	30 TO 33	66	29.94	14	CUMULUS CLOUDING	34 TO 37	66	29.99	20	111.3	2500
1120152005WC	LIGHT SNOW	30 TO 33	75	29.97	14	LIGHT SNOW	30 TO 33	75	30. 1	17	110.5	2500
1120164606WC	LIGHT SNOW	30 TO 33	59	29.97	13	LIGHT SNOW	30 TO 33	59	30. 4	19	101.4	2500
1120204509WC	HEAVY SNOW	26 TO 29	75	30. 7	14	HEAVY SNOW	30 TO 33	75	30.11	18	110.8	2000
1120211410WC	HEAVY SNOW	26 TO 29	81	30. 8	13	HEAVY SNOW	26 TO 29	81	30.12	20	116.3	500

TEST RECORD
POINT PETRE, WINTER

X-BAND

TEST	WEATHER	RECEIVE SITE TEMP DEGREES F.	REL HUM PERCENT	BARO PRES INCHES MERCURY	WIND SPEED KNOTS	WEATHER	TRANSMIT SITE TEMP DEGREES F.	REL HUM PERCENT	BARO PRES INCHES MERCURY	WIND SPEED KNOTS	SIGNAL STRG -DBM	CLOUD LEVEL FEET
1202130503WX	CUMULUS CLOUDING	14 TO 17	81	29.71	9	STRATUS CLOUDING	30 TO 33	79	29. 1	17	102.1	2200
1202170006WX	CUMULUS CLOUDING	14 TO 17	81	29.71	9	STRATUS CLOUDING	34 TO 37	82	25.85	15	104.6	2200
1203113006WX	ALTO CUMULUS	18 TO 21	74	29.41	18	STRATUS CLOUDING	26 TO 29	82	28.77	13	107.6	9K
1203151817WX	CUMULUS CLOUDING	22 TO 25	75	29.47	20	CUMULUS CLOUDING	26 TO 29	63	28.85	19	100.3	2800
1204110005WX	ALTO CUMULUS	18 TO 21	74	29.54	20	LIGHT SNOW	26 TO 29	71	29.26	17	102.3	9K
1204165511WX	CUMULUS CLOUDING	22 TO 25	79	29.64	16	STRATUS CLOUDING	26 TO 29	69	29.31	16	90.6	3K
1204170812WX	CUMULUS CLOUDING	22 TO 25	79	29.64	16	STRATUS CLOUDING	26 TO 29	69	29.31	16	92.2	3K
1205095001NX	CLEAR	14 TO 17	77	29.93	13	STRATUS CLOUDING	26 TO 29	68	29.68	15	101.8	3K
1205101002NX	CLEAR	14 TO 17	77	29.93	13	STRATUS CLOUDING	26 TO 29	68	29.68	15	104.6	3K
1205103003NX	CLEAR	14 TO 17	77	29.93	13	STRATUS CLOUDING	26 TO 29	68	29.68	15	109.0	3K
1205112004WX	ALTO CUMULUS	14 TO 17	75	29.93	15	CUMULUS CLOUDING	26 TO 29	58	29.61	16	90.6	16K
1205114505WX	ALTO CUMULUS	14 TO 17	75	29.93	15	CUMULUS CLOUDING	26 TO 29	58	29.61	16	88.7	16K
1205121006WX	ALTO CUMULUS	18 TO 21	71	29.92	11	CUMULUS CLOUDING	30 TO 33	58	29.59	14	94.0	20K
1205123507WX	ALTO CUMULUS	18 TO 21	71	29.92	11	CUMULUS CLOUDING	30 TO 33	58	29.59	14	95.2	20K
1205135008WX	CUMULUS CLOUDING	22 TO 25	70	29.89	11	STRATUS CLOUDING	26 TO 29	58	29.59	13	88.3	25K
1205141509WX	CUMULUS CLOUDING	22 TO 25	70	29.89	11	STRATUS CLOUDING	26 TO 29	58	29.59	13	80.3	25K
1205144010WX	CUMULUS CLOUDING	22 TO 25	70	29.89	11	STRATUS CLOUDING	26 TO 29	58	29.59	13	93.6	25K
1205150011WX	CUMULUS CLOUDING	22 TO 25	70	29.89	11	STRATUS CLOUDING	26 TO 29	58	29.59	13	91.3	25K
1205152512WX	CUMULUS CLOUDING	22 TO 25	70	29.91	14	STRATUS CLOUDING	26 TO 29	55	29.60	15	93.1	1400
1205154513WX	CUMULUS CLOUDING	22 TO 25	70	29.91	14	STRATUS CLOUDING	26 TO 29	55	29.60	15	91.8	1400
1208160501NX	RAIN, STAT CLOUD	34 TO 37	99	29.72	6	STRATUS CLOUDING	34 TO 37	92	29.36	5	114.2	200
1208165503WX	RAIN, STAT CLOUD	34 TO 37	99	29.73	7	STRATUS CLOUDING	34 TO 37	92	29.36	5	90.8	200
1208173505WX	RAIN, STAT CLOUD	34 TO 37	99	29.73	7	STRATUS CLOUDING	34 TO 37	92	29.36	5	95.4	200
1208182007WX	RAIN, STAT CLOUD	34 TO 37	99	29.74	6	STRATUS CLOUDING	34 TO 37	96	29.37	3	93.1	200
1208190509WX	RAIN, STAT CLOUD	34 TO 37	99	29.74	4	STRATUS CLOUDING	34 TO 37	96	29.38	3	90.8	100
1208201511WX	RAIN, STAT CLOUD	34 TO 37	99	29.76	0	LIGHT SNOW	34 TO 37	92	29.38	4	93.7	200
1208210013WX	RAIN, STAT CLOUD	34 TO 37	99	29.74	6	STRATUS CLOUDING	34 TO 37	93	29.38	3	95.2	300
1208214515WX	RAIN, STAT CLOUD	34 TO 37	99	29.74	6	STRATUS CLOUDING	34 TO 37	92	29.40	4	95.4	300
1208223017WX	RAIN, STAT CLOUD	34 TO 37	99	29.76	4	STRATUS CLOUDING	34 TO 37	92	29.40	4	94.9	400
1208225018WX	RAIN, STAT CLOUD	34 TO 37	99	29.76	4	STRATUS CLOUDING	34 TO 37	89	29.40	6	92.0	400
1209093501WX	CLEAR	30 TO 33	69	29.95	8	STRATUS CLOUDING	30 TO 33	85	29.58	3	92.2	400
1209102003WX	CLEAR	30 TO 33	73	29.93	5	STRATUS CLOUDING	34 TO 37	86	29.58	4	90.1	10K
1209111005WX	ALTO CUMULUS	34 TO 37	73	29.96	5	STRATUS CLOUDING	38 TO 41	79	29.58	3	93.1	18K
1209115507WX	ALTO CUMULUS	34 TO 37	62	29.93	5	STRATUS CLOUDING	38 TO 41	65	29.58	6	92.6	18K
1209123509WX	ALTO CUMULUS	34 TO 37	62	29.93	5	STRATUS CLOUDING	38 TO 41	65	29.58	6	97.0	18K
1209131010WX	CLEAR	34 TO 37	64	29.93	7	STRATUS CLOUDING	38 TO 41	67	29.55	5	90.5	
1209143011WX	ALTO CUMULUS	38 TO 41	60	29.93	9	STRATUS CLOUDING	38 TO 41	65	29.55	4	97.7	15K
1209151513WX	STRUS CLOUDING	34 TO 37	63	29.93	7	STRATUS CLOUDING	38 TO 41	65	29.55	5	98.7	25K
1209160015WX	STRUS CLOUDING	34 TO 37	66	29.96	6	STRATUS CLOUDING	38 TO 41	65	29.55	5	98.9	15K
1210101001WX	LIGHT FOG	26 TO 29	93	29.93	15	STRATUS CLOUDING	34 TO 37	85	29.47	7	93.0	300
1210105503WX	CUMULUS CLOUDING	26 TO 29	96	29.93	14	STRATUS CLOUDING	34 TO 37	79	29.46	8	82.8	400
1210114505WX	CUMULUS CLOUDING	26 TO 29	96	29.93	14	STRATUS CLOUDING	34 TO 37	79	29.46	8	84.5	400
1210124508WX	STRUS CLOUDING	30 TO 33	88	29.92	10	STRATUS CLOUDING	34 TO 37	79	29.38	9	85.4	1K
1210200021WX	RAIN, CUM CLOUD	30 TO 33	89	29.63	12	STRATUS CLOUDING	34 TO 37	82	29.28	10	81.6	2300
1210202022WX	RAIN, CUM CLOUD	30 TO 33	89	29.63	12	STRATUS CLOUDING	34 TO 37	82	29.28	10	82.9	2300
1210214023WX	RAIN, CUM CLOUD	30 TO 33	91	29.54	15	STRATUS CLOUDING	34 TO 37	82	29.28	10	8[illegible].8	2300
1210222025WX	RAIN, STAT CLOUD	30 TO 33	91	29.47	16	STRATUS CLOUDING	34 TO 37	82	29.28	10	81.5	900

TEST	RECEIVE SITE WEATHER	RECEIVE SITE TEMP DEGREES F.	RECEIVE SITE REL HUM PERCENT	RECEIVE SITE BARO PRES INCHES MERCURY	RECEIVE SITE WIND SPEED KNOTS	TRANSMIT SITE WEATHER	TRANSMIT SITE TEMP DEGREES F.	TRANSMIT SITE REL HUM PERCENT	TRANSMIT SITE BARO PRES INCHES MERCURY	TRANSMIT SITE WIND SPEED KNOTS	SIGNAL STRG -DBM	CLOUD LEVEL FEET
1210230427WX	RAIN, STAT CLOUD	30 TO 33	94	29.41	16	STRATUS CLOUDING	34 TO 37	82	29.28	10	8 .5	900
1211110803WX	STRATUS CLOUDING	34 TO 37	97	28.98	19	STRATUS CLOUDING	38 TO 41	89	28.72	21	10 .8	600
1211120505WX	STRATUS CLOUDING	34 TO 37	92	28.98	28	STRATUS CLOUDING	38 TO 41	89	28.72	21	96.0	1100
1211130007WX	STRATUS CLOUDING	34 TO 37	84	28.97	28	STRATUS CLOUDING	38 TO 41	89	28.79	22	91.7	5K
1211135509WX	RAIN, STAT CLOUD	34 TO 37	84	28.99	29	STRATUS CLOUDING	38 TO 41	89	28.79	22	9 .6	1500
1215104503WX	ALTO CUMULUS	22 TO 25	82	29.62	11	STRATUS CLOUDING	26 TO 29	85	29.26	12	103.9	7K
1215114505WX	CUMULUS CLOUDING	22 TO 25	82	29.62	11	STRATUS CLOUDING	26 TO 29	82	29.26	11	94.2	7K
1215121006WX	STRUS CLOUDING	22 TO 25	76	29.59	11	STRATUS CLOUDING	26 TO 29	82	29.26	11	94.0	5K
1215133507WX	ALTO CUMULUS	26 TO 29	70	29.58	11	STRATUS CLOUDING	30 TO 33	72	29.27	9	93.0	12K
1215142609WX	ALTO CUMULUS	26 TO 29	72	29.59	12	STRATUS CLOUDING	26 TO 29	63	29.27	13	91.6	12K
1215151011WX	ALTO CUMULUS	26 TO 29	71	29.61	8	STRATUS CLOUDING	26 TO 29	61	29.27	9	85.8	4500
1215161514WX	STRATUS CLOUDING	26 TO 29	73	29.62	12	STRATUS CLOUDING	26 TO 29	29	29.32	15	95.0	4100
1216090501WX	CUMULUS CLOUDING	14 TO 17	79	29.96	11	HEAVY SNOW	22 TO 25	88	29.54	7	92.1	2600
1216101404WX	CLEAR	14 TO 17	74	29.91	10	HEAVY SNOW	22 TO 25	88	29.57	8	94.3	
1216125009WX	CLEAR	18 TO 21	72	29.91	15	STRATUS CLOUDING	26 TO 29	85	29.57	8	94.8	
1216135612WX	LIGHT SNOW	22 TO 25	73	29.96	16	STRATUS CLOUDING	26 TO 29	85	29.57	8	97.5	
1216144014WX	LIGHT SNOW	22 TO 25	73	29.96	16	STRATUS CLOUDING	26 TO 29	85	29.57	8	96.7	
1216152516WX	LIGHT SNOW	22 TO 25	72	29.96	12	STRATUS CLOUDING	26 TO 29	82	29.56	8	96.9	
1216160818WX	CLEAR	18 TO 21	78	29.91	11	STRATUS CLOUDING	26 TO 29	82	29.56	8	89.3	
1217094501WX	STRUS CLOUDING	14 TO 17	80	30. 2	12	STRATUS CLOUDING	26 TO 29	85	29.65	9	88.3	28K
1217104404WX	STRUS CLOUDING	14 TO 17	80	30. 2	12	STRATUS CLOUDING	26 TO 29	88	29.65	9	91.4	28K
1217113006WX	STRUS CLOUDING	14 TO 17	78	30. 1	9	STRATUS CLOUDING	26 TO 29	88	29.65	9	91.5	28K
1217124209WX	STRUS CLOUDING	18 TO 21	75	30. 0	9	STRATUS CLOUDING	30 TO 33	78	29.65	11	91.5	28K
1217134412WX	STRUS CLOUDING	18 TO 21	73	29.98	8	STRATUS CLOUDING	30 TO 33	75	29.62	12	89.7	
1217145015WX	STRUS CLOUDING	18 TO 21	65	29.98	5	STRATUS CLOUDING	30 TO 33	69	29.62	8	90.9	
0106131001WX	CUMULUS CLOUDING	18 TO 21	69	30. 9	0	HEAVY SNOW	18 TO 21	62	29.44	8	95.3	5K
0106133202WX	CUMULUS CLOUDING	18 TO 21	69	30. 9	0	HEAVY SNOW	18 TO 21	62	29.44	8	94.8	5K
0106151003WX	CUMULUS CLOUDING	22 TO 25	56	30. 7	0	HEAVY SNOW	22 TO 25	62	29.44	10	9 .4	3K
0106153004WX	CUMULUS CLOUDING	22 TO 25	56	30. 7	0	HEAVY SNOW	22 TO 25	62	29.44	10	99.1	3K
0106155005WX	CUMULUS CLOUDING	18 TO 21	54	30.11	5	HEAVY SNOW	18 TO 21	62	29.41	6	99.9	10K
0106161606WX	CUMULUS CLOUDING	18 TO 21	54	30.11	5	HEAVY SNOW	18 TO 21	62	29.41	6	99.5	10K
0106163607WX	CUMULUS CLOUDING	18 TO 21	54	30.11	5	HEAVY SNOW	18 TO 21	62	29.41	6	94.4	10K
0107103502WX	CUMULUS CLOUDING	14 TO 17	64	29.68	10	STRATUS CLOUDING	14 TO 17	84	29.22	0	113.2	4800
0107112404WX	CUMULUS CLOUDING	14 TO 17	63	29.63	10	STRATUS CLOUDING	18 TO 21	82	29.22	0	102.7	5K
0107114605WX	CUMULUS CLOUDING	14 TO 17	63	29.63	10	STRATUS CLOUDING	22 TO 25	86	29.22	7	104.4	5K
0107122006WX	CUMULUS CLOUDING	14 TO 17	65	29.88	13	STRATUS CLOUDING	22 TO 25	86	29.22	7	107.7	4700
0107124507WX	CUMULUS CLOUDING	14 TO 17	65	29.88	13	STRATUS CLOUDING	22 TO 25	77	29.20	11	107.7	4700
0107131509WX	CUMULUS CLOUDING	18 TO 21	65	29.86	14	STRATUS CLOUDING	22 TO 25	77	29.20	11	107.3	5K
0107143210WX	STRATUS CLOUDING	18 TO 21	63	29.58	10	STRATUS CLOUDING	22 TO 25	75	29.20	15	103.6	7K
0107145611WX	CUMULUS CLOUDING	18 TO 21	63	29.58	10	STRATUS CLOUDING	22 TO 25	70	29.20	14	10 .5	2K
0107151612WX	CUMULUS CLOUDING	18 TO 21	63	29.58	10	STRATUS CLOUDING	22 TO 25	70	29.20	14	101.9	2K
0107153613WX	CUMULUS CLOUDING	18 TO 21	63	29.58	10	STRATUS CLOUDING	22 TO 25	70	29.20	14	102.9	2K
0113145601WX	CUMULUS CLOUDING	14 TO 17	63	29.97	17	STRATUS CLOUDING	22 TO 25	65	29.36	14	85.9	1500
0113151302WX	CUMULUS CLOUDING	14 TO 17	63	29.97	17	STRATUS CLOUDING	22 TO 25	65	29.36	14	86.0	1500
0113153603WX	CUMULUS CLOUDING	14 TO 17	63	29.97	17	STRATUS CLOUDING	22 TO 25	65	29.36	14	87.1	1500
0113160204WX	CUMULUS CLOUDING	14 TO 17	71	29.98	18	STRATUS CLOUDING	22 TO 25	68	29.36	18	86.8	1500
0113162005WX	CUMULUS CLOUDING	14 TO 17	71	29.98	18	STRATUS CLOUDING	22 TO 25	68	29.36	18	86.6	1500
0113164406WX	CUMULUS CLOUDING	14 TO 17	71	29.98	18	STRATUS CLOUDING	22 TO 25	68	29.37	19	85.7	1500
0114102001WX	CLEAR	-6 TO -3	69	30.23	15	STRATUS CLOUDING	10 TO 13	80	29.58	11	94.8	
0114104502WX	CLEAR	-6 TO -3	69	30.23	15	STRATUS CLOUDING	10 TO 13	70	29.58	11	94.3	
0114112504WX	ALTO CUMULUS	-2 TO .1	67	30.23	14	STRATUS CLOUDING	10 TO 13	70	29.58	11	92.9	10K
0114121206WX	CLEAR	-2 TO .1	75	30.27	16	STRATUS CLOUDING	10 TO 13	67	29.58	11	9 .1	
0114125608WX	CLEAR	-2 TO .1	53	30.19	14	STRATUS CLOUDING	10 TO 13	65	29.55	11	93.8	
0114134010WX	CLEAR	-2 TO .1	53	30.19	14	STRATUS CLOUDING	10 TO 13	71	29.55	12	9 .5	
0114152211WX	CUMULUS CLOUDING	2 TO 5	60	30.17	18	STRATUS CLOUDING	10 TO 13	68	29.55	12	8 .1	2K

TEST	WEATHER	RECEIVE SITE TEMP DEGREES F.	REL HUM PERCENT	BARO PRES INCHES MERCURY	WIND SPEED KNOTS	TRANSMIT SITE WEATHER	TEMP DEGREES F.	REL HUM PERCENT	BARO PRES INCHES MERCURY	WIND SPEED KNOTS	SIGNAL STRG -DBM	CLOUD LEVEL FEET
0114154212WX	CUMULUS CLOUDING	2 TO 5	60	30.17	18	STRATUS CLOUDING	10 TO 13	68	29.56	16	8[illegible].3	2K
0114160813WX	CUMULUS CLOUDING	2 TO 5	56	30.17	19	STRATUS CLOUDING	10 TO 13	68	29.56	16	8[illegible].7	2K
0114165415WX	CUMULUS CLOUDING	-2 TO .1	76	30.20	13	STRATUS CLOUDING	10 TO 13	70	29.56	17	89.1	2K
0114173817WX	CUMULUS CLOUDING	-2 TO .1	76	30.20	13	STRATUS CLOUDING	10 TO 13	70	29.56	17	80.1	2K
0114182219WX	CLEAR	-2 TO .1	78	30.22	11	STRATUS CLOUDING	6 TO 9	73	29.56	12	8[illegible].9	
0114190621WX	CLEAR	-2 TO .1	78	30.23	13	STRATUS CLOUDING	6 TO 9	72	29.60	7	8[illegible].7	
0114205023NX	CLEAR	-6 TO -3	66	30.28	11	STRATUS CLOUDING	2 TO 5	79	29.60	9	93.4	
0115110605WX	STRUS CLOUDING	-6 TO -3	77	30.44	6	STRATUS CLOUDING	6 TO 9	83	29.72	6	8[illegible].8	27K
0115112606WX	STRUS CLOUDING	-6 TO -3	77	30.44	6	STRATUS CLOUDING	6 TO 9	83	29.72	6	9[illegible].2	27K

TEST RECORD
POINT PETRE, WINTER

C-BAND

TEST	RECEIVE SITE WEATHER	RECEIVE SITE TEMP DEGREES F.	RECEIVE SITE REL HUM PERCENT	RECEIVE SITE BARO PRES INCHES MERCURY	RECEIVE SITE WIND SPEED KNOTS	TRANSMIT SITE WEATHER	TRANSMIT SITE TEMP DEGREES F.	TRANSMIT SITE REL HUM PERCENT	TRANSMIT SITE BARO PRES INCHES MERCURY	TRANSMIT SITE WIND SPEED KNOTS	SIGNAL STRG -DBM	CLOUD LEVEL FEET
1202130503WC	CUMULUS CLOUDING	14 TO 17	81	29.71	9	STRATUS CLOUDING	30 TO 33	79	29. 1	17	92.6	2200
1202170006WC	CUMULUS CLOUDING	14 TO 17	81	29.71	9	STRATUS CLOUDING	34 TO 37	82	25.85	15	102.5	2200
1203113006WC	ALTO CUMULUS	18 TO 21	74	29.41	18	STRATUS CLOUDING	26 TO 29	82	28.77	13	104.3	9K
1203151817WC	CUMULUS CLOUDING	22 TO 25	75	29.47	20	CUMULUS CLOUDING	26 TO 29	63	28.85	19	9?.7	2800
1204110005WC	ALTO CUMULUS	18 TO 21	74	29.54	20	LIGHT SNOW	26 TO 29	71	29.26	17	102.3	9K
1205095001WC	CLEAR	14 TO 17	77	29.93	13	STRATUS CLOUDING	26 TO 29	68	29.68	15	85.3	3K
1205101002WC	CLEAR	14 TO 17	77	29.93	13	STRATUS CLOUDING	26 TO 29	68	29.68	15	84.7	3K
1205103003WC	CLEAR	14 TO 17	77	29.93	13	STRATUS CLOUDING	26 TO 29	68	29.68	15	84.6	3K
1205112004WC	ALTO CUMULUS	14 TO 17	75	29.93	15	CUMULUS CLOUDING	26 TO 29	58	29.61	16	83.9	16K
1205114505WC	ALTO CUMULUS	14 TO 17	75	29.93	15	CUMULUS CLOUDING	26 TO 29	58	29.61	16	83.7	16K
1205121006WC	ALTO CUMULUS	18 TO 21	71	29.92	11	CUMULUS CLOUDING	30 TO 33	58	29.59	14	84.5	20K
1205123507WC	ALTO CUMULUS	18 TO 21	71	29.92	11	CUMULUS CLOUDING	30 TO 33	58	29.59	14	84.4	20K
1205135008WC	CUMULUS CLOUDING	22 TO 25	70	29.89	11	STRATUS CLOUDING	26 TO 29	58	29.59	13	84.5	25K
1205141509WC	CUMULUS CLOUDING	22 TO 25	70	29.89	11	STRATUS CLOUDING	26 TO 29	58	29.59	13	83.1	25K
1205144010WC	CUMULUS CLOUDING	22 TO 25	70	29.89	11	STRATUS CLOUDING	26 TO 29	58	29.59	13	85.5	25K
1205152512WC	CUMULUS CLOUDING	22 TO 25	70	29.91	14	STRATUS CLOUDING	26 TO 29	55	29.60	15	84.0	1400
1205154513WC	CUMULUS CLOUDING	22 TO 25	70	29.91	14	STRATUS CLOUDING	26 TO 29	55	29.60	15	84.8	1400
1205162514WC	ALTO CUMULUS	18 TO 21	70	29.91	15	STRATUS CLOUDING	26 TO 29	55	29.59	5	84.9	22K
1205164515WC	ALTO CUMULUS	18 TO 21	70	29.91	15	STRATUS CLOUDING	26 TO 29	55	29.59	5	85.8	22K
1208160501WC	RAIN, STAT CLOUD	34 TO 37	99	29.72	6	STRATUS CLOUDING	34 TO 37	92	29.36	5	96.5	200
1208165503WC	RAIN. STAT CLOUD	34 TO 37	99	29.73	7	STRATUS CLOUDING	34 TO 37	92	29.36	5	95.8	200
1208173505WC	RAIN. STAT CLOUD	34 TO 37	99	29.73	7	STRATUS CLOUDING	34 TO 37	92	29.36	5	91.9	200
1208182007WC	RAIN. STAT CLOUD	34 TO 37	99	29.74	6	STRATUS CLOUDING	34 TO 37	94	29.37	6	90.2	200
1208190509WC	RAIN, STAT CLOUD	34 TO 37	99	29.74	4	STRATUS CLOUDING	34 TO 37	94	29.38	3	87.2	100
1208201511WC	RAIN. STAT CLOUD	34 TO 37	99	29.75	0	LIGHT SNOW	34 TO 37	92	29.38	4	90.2	200
1208210013WC	RAIN. STAT CLOUD	34 TO 37	99	29.74	6	STRATUS CLOUDING	34 TO 37	93	29.38	3	87.5	300
1208214515WC	RAIN, STAT CLOUD	34 TO 37	99	29.74	6	STRATUS CLOUDING	34 TO 37	92	29.40	4	82.8	300
1208223017WC	RAIN. STAT CLOUD	34 TO 37	99	29.75	4	STRATUS CLOUDING	34 TO 37	92	29.40	4	84.1	400
1208225018WC	RAIN. STAT CLOUD	34 TO 37	99	29.75	4	STRATUS CLOUDING	34 TO 37	89	29.40	6	85.3	400
1209093501WC	CLEAR	30 TO 33	69	29.92	8	STRATUS CLOUDING	30 TO 33	85	29.58	3	90.0	400
1209102003WC	CLEAR	30 TO 33	73	29.93	5	STRATUS CLOUDING	34 TO 37	86	29.58	4	85.2	10K
1209111005WC	ALTO CUMULUS	34 TO 37	73	29.95	5	STRATUS CLOUDING	38 TO 41	70	29.58	3	87.5	18K
1209115507WC	ALTO CUMULUS	34 TO 37	62	29.93	5	STRATUS CLOUDING	38 TO 41	65	29.58	6	84.5	18K
1209123509WC	ALTO CUMULUS	34 TO 37	62	29.93	5	STRATUS CLOUDING	38 TO 41	65	29.58	6	80.9	18K
1209131010WC	CLEAR	34 TO 37	64	29.93	7	STRATUS CLOUDING	38 TO 41	67	29.55	5	87.3	
1209143011WC	ALTO CUMULUS	38 TO 41	60	29.93	9	STRATUS CLOUDING	38 TO 41	65	29.55	4	92.6	15K
1209151513WC	STRUS CLOUDING	34 TO 37	63	29.93	7	STRATUS CLOUDING	38 TO 41	65	29.55	5	95.1	25K
1209160015WC	ALTO CUMULUS	34 TO 37	66	29.96	6	STRATUS CLOUDING	38 TO 41	65	29.55	5	92.7	15K
1210101001WC	LIGHT FOG	26 TO 29	93	29.94	15	STRATUS CLOUDING	34 TO 37	85	29.47	7	81.9	300
1210105503WC	CUMULUS CLOUDING	26 TO 29	96	29.93	14	STRATUS CLOUDING	34 TO 37	79	29.46	8	8?.4	400
1210114505WC	CUMULUS CLOUDING	26 TO 29	96	29.93	14	STRATUS CLOUDING	34 TO 37	79	29.46	8	74.8	400
1210124508WC	STRUS CLOUDING	30 TO 33	88	29.92	10	STRATUS CLOUDING	34 TO 37	79	29.35	9	75.1	1K
1210200021NC	RAIN, CUM CLOUD	30 TO 33	89	29.63	12	STRATUS CLOUDING	34 TO 37	82	29.28	10	90.8	2300
1210202022NC	RAIN. CUM CLOUD	30 TO 33	89	29.63	12	STRATUS CLOUDING	34 TO 37	82	29.28	10	100.6	2300
1210214023WC	RAIN. CUM CLOUD	30 TO 33	91	29.54	15	STRATUS CLOUDING	34 TO 37	82	29.28	10	77.1	2300
1210222025WC	RAIN. STAT CLOUD	30 TO 33	91	29.47	16	STRATUS CLOUDING	34 TO 37	82	29.28	10	74.5	900
1210230427WC	RAIN. STAT CLOUD	30 TO 33	94	29.41	16	STRATUS CLOUDING	34 TO 37	82	29.28	10	75.0	900

TEST	RECEIVE SITE WEATHER	RECEIVE SITE TEMP DEGREES F.	RECEIVE SITE REL HUM PERCENT	RECEIVE SITE BARO PRES INCHES MERCURY	RECEIVE SITE WIND SPEED KNOTS	TRANSMIT SITE WEATHER	TRANSMIT SITE TEMP DEGREES F.	TRANSMIT SITE REL HUM PERCENT	TRANSMIT SITE BARO PRES INCHES MERCURY	TRANSMIT SITE WIND SPEED KNOTS	SIGNAL STRG -DBM	CLOUD LEVEL FEET
1211110503WC	STRATUS CLOUDING	34 TO 37	97	28.98	19	STRATUS CLOUDING	38 TO 41	89	28.72	21	95.3	600
1211120505WC	STRATUS CLOUDING	34 TO 37	92	28.98	28	STRATUS CLOUDING	38 TO 41	89	28.72	21	92.8	1100
1211130007WC	STRATUS CLOUDING	34 TO 37	84	28.97	28	STRATUS CLOUDING	38 TO 41	89	28.79	22	91.4	5K
1211135509WC	RAIN, STAT CLOUD	34 TO 37	84	28.99	29	STRATUS CLOUDING	38 TO 41	89	28.79	22	9[illegible].4	1500
1215104503WC	ALTO CUMULUS	22 TO 25	82	29.62	11	STRATUS CLOUDING	26 TO 29	85	29.26	12	111.1	7K
1215114505WC	CUMULUS CLOUDING	22 TO 25	82	29.62	11	STRATUS CLOUDING	26 TO 29	82	29.26	11	94.9	7K
1215121006WC	STRUS CLOUDING	22 TO 25	76	29.58	11	STRATUS CLOUDING	26 TO 29	82	29.26	11	93.1	5K
1215133507WC	ALTO CUMULUS	26 TO 29	70	29.58	11	STRATUS CLOUDING	30 TO 33	72	29.27	9	88.8	12K
1215142609WC	ALTO CUMULUS	26 TO 29	72	29.59	12	STRATUS CLOUDING	26 TO 29	63	29.27	13	87.0	12K
1215151011WC	ALTO CUMULUS	26 TO 29	71	29.61	8	STRATUS CLOUDING	26 TO 29	61	29.27	9	84.7	4500
1215161514WC	STRATUS CLOUDING	26 TO 29	73	29.63	12	STRATUS CLOUDING	26 TO 29	29	29.32	15	94.8	4100
1216090501WC	CUMULUS CLOUDING	14 TO 17	79	29.92	11	HEAVY SNOW	22 TO 25	88	29.54	7	90.8	2600
1216101404WC	CLEAR	14 TO 17	74	29.91	10	HEAVY SNOW	22 TO 25	88	29.57	8	94.2	
1216105506WC	CLEAR	18 TO 21	72	29.91	15	STRATUS CLOUDING	26 TO 29	85	29.57	8	96.0	
1216120507WC	CLEAR	18 TO 21	73	29.92	16	STRATUS CLOUDING	26 TO 29	85	29.57	8	96.4	
1216125009WC	CLEAR	18 TO 21	72	29.89	16	STRATUS CLOUDING	26 TO 29	85	29.56	8	92.0	
1216135612WC	CLEAR	22 TO 25	74	29.88	8	STRATUS CLOUDING	26 TO 29	85	29.56	11	82.8	
1216144014WC	CLEAR	22 TO 25	74	29.88	8	STRATUS CLOUDING	26 TO 29	85	29.56	11	87.7	
1216152516WC	CLEAR	22 TO 25	72	29.92	12	STRATUS CLOUDING	26 TO 29	82	29.56	8	84.2	
1216160818WC	CLEAR	18 TO 21	78	29.91	11	STRATUS CLOUDING	26 TO 29	82	29.56	8	85.5	
1217094501WC	STRUS CLOUDING	14 TO 17	80	30. 5	12	STRATUS CLOUDING	26 TO 29	85	29.65	9	80.3	28K
1217104404WC	STRUS CLOUDING	14 TO 17	80	30. 5	12	STRATUS CLOUDING	26 TO 29	88	29.65	9	83.2	28K
1217113006WC	STRUS CLOUDING	14 TO 17	78	30. 1	9	STRATUS CLOUDING	26 TO 29	88	29.65	9	81.7	28K
1217124209WC	STRUS CLOUDING	18 TO 21	75	30. 2	9	STRATUS CLOUDING	30 TO 33	78	29.65	11	83.8	28K
1217134412WC	STRUS CLOUDING	18 TO 21	73	29.98	8	STRATUS CLOUDING	30 TO 33	75	29.62	12	81.6	
1217145015WC	STRUS CLOUDING	18 TO 21	65	29.98	5	STRATUS CLOUDING	30 TO 33	69	29.62	8	83.2	
0106131601WC	CUMULUS CLOUDING	18 TO 21	69	30. 9	0	HEAVY SNOW	18 TO 21	62	29.44	8	9[illegible].6	5K
0106133202WC	CUMULUS CLOUDING	18 TO 21	69	30. 9	0	HEAVY SNOW	18 TO 21	62	29.44	8	9[illegible].4	5K
0106151003WC	CUMULUS CLOUDING	22 TO 25	56	30. 7	0	HEAVY SNOW	22 TO 25	62	29.44	10	92.4	3K
0106153004WC	CUMULUS CLOUDING	22 TO 25	56	30. 7	0	HEAVY SNOW	22 TO 25	62	29.44	10	92.5	3K
0106155005WC	CUMULUS CLOUDING	18 TO 21	54	30.11	5	HEAVY SNOW	18 TO 21	62	29.41	6	92.8	10K
0106161606WC	CUMULUS CLOUDING	18 TO 21	54	30.11	5	HEAVY SNOW	18 TO 21	62	29.41	6	93.7	10K
0106163607WC	CUMULUS CLOUDING	18 TO 21	54	30.11	5	HEAVY SNOW	18 TO 21	62	29.41	6	93.5	10K
0107100701WC	CUMULUS CLOUDING	14 TO 17	64	29.65	10	STRATUS CLOUDING	14 TO 17	84	29.22	0	95.0	4800
0107103502WC	CUMULUS CLOUDING	14 TO 17	64	29.65	10	STRATUS CLOUDING	14 TO 17	84	29.22	0	97.6	4800
0107105503WC	CUMULUS CLOUDING	14 TO 17	63	29.63	10	STRATUS CLOUDING	18 TO 21	82	29.22	0	101.8	5K
0107112404WC	CUMULUS CLOUDING	14 TO 17	63	29.63	10	STRATUS CLOUDING	18 TO 21	82	29.22	0	102.4	5K
0107114605WC	CUMULUS CLOUDING	14 TO 17	63	29.63	10	STRATUS CLOUDING	22 TO 25	86	29.22	7	104.0	5K
0107143210WC	STRATUS CLOUDING	18 TO 21	63	29.58	10	STRATUS CLOUDING	22 TO 25	75	29.20	15	102.4	7K
0107145611WC	CUMULUS CLOUDING	18 TO 21	63	29.58	10	STRATUS CLOUDING	22 TO 25	70	29.20	14	98.7	2K
0107151612WC	CUMULUS CLOUDING	18 TO 21	63	29.58	10	STRATUS CLOUDING	22 TO 25	70	29.20	14	100.2	2K
0107153613WC	CUMULUS CLOUDING	18 TO 21	63	29.58	10	STRATUS CLOUDING	22 TO 25	70	29.20	14	10[illegible].3	2K
0113145601WC	CUMULUS CLOUDING	14 TO 17	73	29.97	17	STRATUS CLOUDING	22 TO 25	65	29.36	14	88.6	1500
0113153603WC	CUMULUS CLOUDING	14 TO 17	73	29.97	17	STRATUS CLOUDING	22 TO 25	65	29.36	14	89.5	1500
0113160204WC	CUMULUS CLOUDING	14 TO 17	71	29.98	18	STRATUS CLOUDING	22 TO 25	68	29.36	18	90.3	1500
0113162005WC	CUMULUS CLOUDING	14 TO 17	71	29.98	18	STRATUS CLOUDING	22 TO 25	38	29.36	18	90.5	1500
0113164406WC	CUMULUS CLOUDING	14 TO 17	71	29.98	18	STRATUS CLOUDING	22 TO 25	68	29.37	19	80.9	1500
0114102001WC	CLEAR	-6 TO -3	69	30.23	15	STRATUS CLOUDING	10 TO 13	80	29.58	11	9[illegible].0	
0114104502WC	CLEAR	-6 TO -3	69	30.23	15	STRATUS CLOUDING	10 TO 13	70	29.58	11	91.0	
0114112504WC	ALTO CUMULUS	-2 TO +1	67	30.23	14	STRATUS CLOUDING	10 TO 13	70	29.58	11	88.2	10K
0114121206WC	CLEAR	-2 TO +1	75	30.21	16	STRATUS CLOUDING	10 TO 13	67	29.58	11	87.7	
0114125608WC	CLEAR	-2 TO +1	53	30.19	14	STRATUS CLOUDING	10 TO 13	65	29.55	11	84.8	
0114134010WC	CLEAR	-2 TO +1	53	30.19	14	STRATUS CLOUDING	10 TO 13	71	29.55	12	84.3	
0114152211WC	CUMULUS CLOUDING	2 TO 5	60	30.17	18	STRATUS CLOUDING	10 TO 13	64	29.55	12	92.1	2K
0114154212WC	CUMULUS CLOUDING	2 TO 5	60	30.17	18	STRATUS CLOUDING	10 TO 13	69	29.56	16	92.7	2K

TEST	RECEIVE SITE WEATHER	RECEIVE SITE TEMP DEGREES F.	RECEIVE SITE REL HUM PERCENT	RECEIVE SITE BARO PRES INCHES MERCURY	RECEIVE SITE WIND SPEED KNOTS	TRANSMIT SITE WEATHER	TRANSMIT SITE TEMP DEGREES F.	TRANSMIT SITE REL HUM PERCENT	TRANSMIT SITE BARO PRES INCHES MERCURY	TRANSMIT SITE WIND SPEED KNOTS	SIGNAL STRG -DBM	CLOUD LEVEL FEET
0114160813WC	CUMULUS CLOUDING	2 TO 5	56	30.17	19	STRATUS CLOUDING	10 TO 13	68	29.56	16	83.9	2K
0114165415WC	CUMULUS CLOUDING	-2 TO .1	76	30.23	13	STRATUS CLOUDING	10 TO 13	70	29.56	17	84.8	2K
0114173817WC	CUMULUS CLOUDING	-2 TO .1	76	30.28	13	STRATUS CLOUDING	10 TO 13	70	29.56	17	84.9	2K
0114182219WC	CLEAR	-2 TO .1	78	30.22	11	STRATUS CLOUDING	10 TO 13	73	29.56	12	82.4	
0114190621WC	CLEAR	-2 TO .1	78	30.23	13	STRATUS CLOUDING	6 TO 9	72	29.60	7	83.0	
0114205023WC	CLEAR	-6 TO -3	66	30.28	11	STRATUS CLOUDING	2 TO 5	79	29.60	9	80.9	
0114213225WC	CLEAR	-6 TO -3	66	30.28	11	STRATUS CLOUDING	2 TO 5	79	29.60	9	81.5	
0114222027WC	CLEAR	-6 TO -3	68	30.29	11	STRATUS CLOUDING	-2 TO .1	83	29.63	7	80.6	
0114230029WC	CLEAR	-6 TO -3	79	30.29	9	STRATUS CLOUDING	2 TO 5	83	29.63	5	84.7	
0115094001WC	STRUS CLOUDING	-10 TO -7	91	30.44	6	STRATUS CLOUDING	6 TO 9	83	29.72	4	76.1	27K
0115100602WC	STRUS CLOUDING	-6 TO -3	85	30.45	6	STRATUS CLOUDING	6 TO 9	83	29.72	4	77.9	27K
0115102603WC	STRUS CLOUDING	-6 TO -3	85	30.48	6	STRATUS CLOUDING	6 TO 9	83	29.72	4	79.1	27K
0115104604WC	STRUS CLOUDING	-6 TO -3	85	30.48	6	STRATUS CLOUDING	6 TO 9	83	29.72	6	78.7	27K
0115110605WC	STRUS CLOUDING	-6 TO -3	77	30.44	6	STRATUS CLOUDING	6 TO 9	83	29.72	6	79.6	27K
0115112606WC	STRUS CLOUDING	-6 TO -3	77	30.44	6	STRATUS CLOUDING	6 TO 9	83	29.72	6	70.8	27K

TEST RECORD
ONTARIO CENTER, WINTER

X-BAND

TEST	RECEIVE SITE WEATHER	RECEIVE SITE TEMP DEGREES F.	RECEIVE SITE REL HUM PERCENT	RECEIVE SITE BARO PRES INCHES MERCURY	RECEIVE SITE WIND SPEED KNOTS	TRANSMIT SITE WEATHER	TRANSMIT SITE TEMP DEGREES F.	TRANSMIT SITE REL HUM PERCENT	TRANSMIT SITE BARO PRES INCHES MERCURY	TRANSMIT SITE WIND SPEED KNOTS	SIGNAL STRG -DBM	CLOUD LEVEL FEET
0123111001*X	HEAVY SNOW	18 TO 21	82	29.87	6	LIGHT SNOW	18 TO 21	84	29.17	12	110.9	3K
0123113202*X	HEAVY SNOW	18 TO 21	82	29.87	6	LIGHT SNOW	18 TO 21	84	29.17	12	109.6	3K
0123120003*X	HEAVY SNOW	18 TO 21	82	29.86	12	HAZY	18 TO 21	80	29.17	12	102.9	2500
0123122004*X	HEAVY SNOW	18 TO 21	82	29.86	12	HAZY	18 TO 21	80	29.17	12	101.5	2500
0123124405*X	HEAVY SNOW	18 TO 21	82	29.86	12	HAZY	18 TO 21	80	29.17	12	100.8	2500
0123130206*X	HAZY	18 TO 21	81	29.85	15	HAZY	18 TO 21	73	29.17	14	100.7	3500
0123132607*X	HAZY	18 TO 21	81	29.85	15	HAZY	18 TO 21	73	29.17	14	100.9	3500
0123134608*X	HAZY	18 TO 21	81	29.85	15	HAZY	18 TO 21	73	29.17	14	100.2	3500
0123142609*X	LIGHT SNOW	18 TO 21	81	29.83	10	LIGHT SNOW	18 TO 21	73	29.16	12	95.8	4K
0123144610*X	LIGHT SNOW	18 TO 21	81	29.83	10	LIGHT SNOW	18 TO 21	73	29.16	12	97.7	4K
0123151011*X	HAZY	18 TO 21	81	29.84	10	LIGHT SNOW	18 TO 21	73	29.16	14	96.9	4K
0123153212*X	HAZY	18 TO 21	81	29.84	10	LIGHT SNOW	18 TO 21	73	29.16	14	97.2	4K
0123154213*X	HAZY	18 TO 21	81	29.84	10	LIGHT SNOW	18 TO 21	73	29.16	14	97.3	4K
0123160014*X	LIGHT SNOW	18 TO 21	81	29.86	10	LIGHT SNOW	18 TO 21	77	29.15	10	90.5	4600
0123162015*X	LIGHT SNOW	18 TO 21	81	29.86	10	LIGHT SNOW	18 TO 21	77	29.15	10	91.4	4600
0126094501*X	HEAVY FOG	22 TO 25	92	29.73	7	SLEET	26 TO 29	85	29. 0	7	100.3	700
0126100602*X	HEAVY SNOW	22 TO 25	94	29.79	10	SLEET	26 TO 29	82	29.12	9	99.8	1K
0126103003*X	HEAVY SNOW	22 TO 25	94	29.79	10	SLEET	26 TO 29	82	29.12	9	98.0	1K
0126105004*X	HEAVY SNOW	22 TO 25	94	29.79	10	SLEET	26 TO 29	82	29.12	9	96.2	1K
0126111405*X	HEAVY SNOW	22 TO 25	90	29.79	7	SLEET	26 TO 29	82	29. 0	7	95.3	1200
0126113206*X	STRATUS CLOUDING	26 TO 29	90	29.79	7	STRATUS CLOUDING	30 TO 33	82	29. 0	7	94.4	1200
0126115407*X	STRATUS CLOUDING	26 TO 29	81	29.80	7	STRATUS CLOUDING	30 TO 33	82	29.12	10	90.2	1500
0126121408*X	STRATUS CLOUDING	26 TO 29	81	29.80	7	STRATUS CLOUDING	30 TO 33	82	29.12	10	93.2	1500
0126131009*X	STRATUS CLOUDING	26 TO 29	82	29.80	7	STRATUS CLOUDING	30 TO 33	75	29.18	9	104.2	1500
0126134410*X	STRATUS CLOUDING	26 TO 29	82	29.80	7	STRATUS CLOUDING	30 TO 33	75	29.18	9	93.6	1500
0126140811*X	STRATUS CLOUDING	26 TO 29	84	29.82	7	STRATUS CLOUDING	30 TO 33	78	29.18	10	92.6	1300
0126142812*X	STRATUS CLOUDING	26 TO 29	84	29.82	7	STRATUS CLOUDING	30 TO 33	78	29.18	10	90.3	1300
0126153413*X	STRATUS CLOUDING	26 TO 29	85	29.85	8	STRATUS CLOUDING	30 TO 33	78	29.18	9	92.0	1500
0126155814*X	STRATUS CLOUDING	26 TO 29	87	29.89	7	STRATUS CLOUDING	26 TO 29	81	29.25	10	92.7	1200
0126162215*X	STRATUS CLOUDING	26 TO 29	87	29.89	7	STRATUS CLOUDING	26 TO 29	81	29.25	10	93.7	1200
0127095201*X	STRATUS CLOUDING	30 TO 33	75	30. 2	9	STRATUS CLOUDING	30 TO 33	78	29.27	10	93.1	3500
0127101402*X	STRATUS CLOUDING	30 TO 33	75	30. 2	9	STRATUS CLOUDING	30 TO 33	78	29.27	10	94.8	3500
0127103603*X	STRATUS CLOUDING	30 TO 33	75	30. 2	9	STRATUS CLOUDING	30 TO 33	78	29.27	10	95.2	3500
0127105604*X	STRATUS CLOUDING	30 TO 33	68	29.98	9	STRATUS CLOUDING	30 TO 33	83	29.37	9	96.1	3500
0127112005*X	STRATUS CLOUDING	30 TO 33	68	29.98	9	STRATUS CLOUDING	30 TO 33	83	29.37	9	94.6	3500
0127114006*X	STRATUS CLOUDING	30 TO 33	68	29.98	9	STRATUS CLOUDING	30 TO 33	83	29.37	9	92.9	3500
0127120607*X	HAZY	34 TO 37	70	29.98	8	STRATUS CLOUDING	30 TO 33	85	29.37	10	93.5	4500
0127122608*X	HAZY	34 TO 37	70	29.98	8	STRATUS CLOUDING	30 TO 33	85	29.37	10	94.6	4500
0127125009*X	HAZY	34 TO 37	70	29.98	8	SLEET	30 TO 33	85	29.37	10	94.5	4500
0127131210*X	STRATUS CLOUDING	34 TO 37	70	29.95	8	SLEET	30 TO 33	85	29.37	10	95.9	5500
0127134211*X	STRATUS CLOUDING	34 TO 37	70	29.95	8	SLEET	30 TO 33	85	29.37	10	95.9	5500
0127140012*X	STRATUS CLOUDING	34 TO 37	72	29.94	7	LIGHT SNOW	34 TO 37	85	29.24	9	93.7	5K
0127142613*X	STRATUS CLOUDING	34 TO 37	72	29.94	7	LIGHT SNOW	34 TO 37	85	29.24	9	96.0	5K
0127144614*X	STRATUS CLOUDING	34 TO 37	72	29.94	7	LIGHT SNOW	34 TO 37	85	29.24	9	96.0	5K
0127150615*X	STRATUS CLOUDING	34 TO 37	73	29.99	8	LIGHT SNOW	34 TO 37	85	29.24	6	97.2	3K
0128121006*X	STRATUS CLOUDING	38 TO 41	69	29.98	8	STRATUS CLOUDING	34 TO 37	72	29.40	14	79.5	7K
0128123007*X	STRATUS CLOUDING	38 TO 41	69	29.98	8	STRATUS CLOUDING	34 TO 37	72	29.40	14	79.3	7K

TEST	RECEIVE SITE WEATHER	RECEIVE SITE TEMP DEGREES F.	RECEIVE SITE REL HUM PERCENT	RECEIVE SITE BARO PRES INCHES MERCURY	RECEIVE SITE WIND SPEED KNOTS	TRANSMIT SITE WEATHER	TRANSMIT SITE TEMP DEGREES F.	TRANSMIT SITE REL HUM PERCENT	TRANSMIT SITE BARO PRES INCHES MERCURY	TRANSMIT SITE WIND SPEED KNOTS	SIGNAL STRG -DBM	CLOUD LEVEL FEET
0128124008WX	STRATUS CLOUDING	38 TO 41	69	29.99	8	STRATUS CLOUDING	34 TO 37	72	29.40	14	86.9	7K
0128135811WX	STRATUS CLOUDING	38 TO 41	65	29.80	13	STRATUS CLOUDING	38 TO 41	62	29.11	11	76.4	7K
0128142012WX	STRATUS CLOUDING	38 TO 41	65	29.80	13	STRATUS CLOUDING	38 TO 41	62	29.11	11	78.0	7K
0128144213WX	STRATUS CLOUDING	38 TO 41	65	29.80	13	STRATUS CLOUDING	38 TO 41	62	29.11	11	77.4	7K
0128151014WX	STRATUS CLOUDING	38 TO 41	62	29.77	18	STRATUS CLOUDING	38 TO 41	62	29.11	8	[illegible]	4500
0128153015WX	STRATUS CLOUDING	38 TO 41	62	29.77	18	STRATUS CLOUDING	38 TO 41	62	29.11	8	[illegible]	4500
0129100001WX	STRATUS CLOUDING	38 TO 41	89	29.61	8	STRATUS CLOUDING	34 TO 37	89	28.97	10	91.4	1K
0129110404WX	STRATUS CLOUDING	38 TO 41	85	29.61	7	STRATUS CLOUDING	34 TO 37	89	28.97	10	88.1	1K
0129120407WX	STRATUS CLOUDING	34 TO 37	89	29.59	7	STRATUS CLOUDING	34 TO 37	93	28.97	11	89.1	800
0129130410WX	RAIN, STAT CLOUD	34 TO 37	93	29.60	9	STRATUS CLOUDING	34 TO 37	93	28.98	12	91.6	600
0129133011WX	RAIN, STAT CLOUD	34 TO 37	93	29.60	9	STRATUS CLOUDING	34 TO 37	93	28.98	12	90.4	600
0129150015WX	RAIN, STAT CLOUD	34 TO 37	85	29.60	11	STRATUS CLOUDING	34 TO 37	88	28.98	11	94.5	1K
0129154017WX	RAIN, STAT CLOUD	34 TO 37	85	29.60	11	STRATUS CLOUDING	34 TO 37	88	28.98	11	88.6	1K
0129165619WX	STRATUS CLOUDING	34 TO 37	89	29.68	9	STRATUS CLOUDING	34 TO 37	93	29. 2	12	93.0	1K
0129174021WX	STRATUS CLOUDING	34 TO 37	89	29.68	9	STRATUS CLOUDING	34 TO 37	93	29. 2	12	93.4	1K
0129184224WX	STRATUS CLOUDING	34 TO 37	85	29.68	9	STRATUS CLOUDING	34 TO 37	88	29. 2	13	93.9	1K
0129194426WX	RAIN, STAT CLOUD	34 TO 37	85	29.70	10	STRATUS CLOUDING	34 TO 37	88	29. 7	15	89.6	1K
0129204629WX	STRATUS CLOUDING	34 TO 37	85	29.70	8	STRATUS CLOUDING	34 TO 37	85	29. 7	15	95.8	1K
0129213031WX	RAIN, STAT CLOUD	34 TO 37	82	29.72	10	STRATUS CLOUDING	34 TO 37	85	29. 7	17	98.3	1100
0129220032WX	STRATUS CLOUDING	34 TO 37	83	29.70	9	STRATUS CLOUDING	34 TO 37	81	29.15	15	100.9	1000
0202170604WX	STRATUS CLOUDING	38 TO 41	85	29.47	5	STRATUS CLOUDING	38 TO 41	93	28.71	8	94.9	1700
0202190609WX	STRATUS CLOUDING	38 TO 41	89	29.40	6	STRATUS CLOUDING	38 TO 41	93	28.71	11	92.8	1K
0202200011WX	RAIN, STAT CLOUD	38 TO 41	93	29.43	6	LIGHT SNOW	34 TO 37	93	28.78	10	98.8	800
0202210014WX	RAIN, STAT CLOUD	34 TO 37	93	29.45	9	LIGHT SNOW	34 TO 37	93	28.69	12	97.5	800
0203105001WX	HEAVY SNOW	10 TO 13	84	29.77	11	LIGHT SNOW	10 TO 13	84	29.11	16	87.8	600
0203115603WX	HEAVY SNOW	10 TO 13	88	29.70	9	HAZY	10 TO 13	83	29.11	16	86.2	500
0203124005WX	HEAVY SNOW	10 TO 13	88	29.70	9	HAZY	10 TO 13	83	29.11	16	88.8	500
0203134407WX	HEAVY SNOW	10 TO 13	88	29.69	13	HAZY	6 TO 9	76	29. 7	12	96.4	400
0203143009WX	HEAVY SNOW	10 TO 13	88	29.68	15	HAZY	10 TO 13	69	29. 7	12	94.3	400
0204115401WX	STRATUS CLOUDING	2 TO 5	57	30.26	8	STRATUS CLOUDING	6 TO 9	48	29.53	13	104.1	2K
0204131403WX	CLEAR	2 TO 5	52	30.26	8	STRATUS CLOUDING	10 TO 13	46	29.55	15	98.3	
0204140005WX	CLEAR	2 TO 5	45	30.27	10	STRATUS CLOUDING	10 TO 13	48	29.55	14	96.6	

TEST RECORD
ONTARIO CENTER, WINTER

C-BAND

TEST	WEATHER	RECEIVE SITE TEMP DEGREES F.	REL HUM PERCENT	BARO PRES INCHES MERCURY	WIND SPEED KNOTS	WEATHER	TRANSMIT SITE TEMP DEGREES F.	REL HUM PERCENT	BARO PRES INCHES MERCURY	WIND SPEED KNOTS	SIGNAL STRG -DBM	CLOUD LEVEL FEET
0123113202WC	HEAVY SNOW	18 TO 21	82	29.87	6	LIGHT SNOW	18 TO 21	84	29.17	12	97.3	3K
0123120003WC	HEAVY SNOW	18 TO 21	82	29.86	12	HAZY	18 TO 21	80	29.17	12	96.8	2500
0123122004WC	HEAVY SNOW	18 TO 21	82	29.86	12	HAZY	18 TO 21	80	29.17	12	96.7	2500
0123124405WC	HEAVY SNOW	18 TO 21	82	29.86	12	HAZY	18 TO 21	80	29.17	12	96.5	2500
0123130206WC	HAZY	18 TO 21	81	29.85	15	HAZY	18 TO 21	73	29.17	14	97.1	3500
0123134608WC	HAZY	18 TO 21	81	29.85	15	HAZY	18 TO 21	73	29.17	14	97.3	3500
0123142609WC	LIGHT SNOW	18 TO 21	81	29.83	10	LIGHT SNOW	18 TO 21	73	29.16	12	95.0	4K
0123144610WC	LIGHT SNOW	18 TO 21	81	29.83	10	LIGHT SNOW	18 TO 21	73	29.16	12	94.1	4K
0123151011WC	HAZY	18 TO 21	81	29.84	10	LIGHT SNOW	18 TO 21	73	29.16	14	92.5	4K
0123154213WC	HAZY	18 TO 21	81	29.84	10	LIGHT SNOW	18 TO 21	73	29.16	14	95.3	4K
0123160014WC	LIGHT SNOW	18 TO 21	81	29.86	10	LIGHT SNOW	18 TO 21	77	29.15	10	90.9	4600
0123162015WC	LIGHT SNOW	18 TO 21	81	29.86	10	LIGHT SNOW	18 TO 21	77	29.15	10	93.9	4600
0126094501WC	HEAVY FOG	22 TO 25	92	29.73	7	SLEET	26 TO 29	65	29. 0	7	95.4	700
0126100602WC	HEAVY SNOW	22 TO 25	94	29.79	10	SLEET	26 TO 29	82	29.12	9	94.7	1K
0126103003WC	HEAVY SNOW	22 TO 25	94	29.79	10	SLEET	26 TO 29	82	29.12	9	93.4	1K
0126111405WC	HEAVY SNOW	22 TO 25	90	29.79	7	SLEET	26 TO 29	82	29. 0	7	90.5	1200
0126113206WC	STRATUS CLOUDING	26 TO 29	90	29.79	7	STRATUS CLOUDING	30 TO 33	82	29. 0	7	90.1	1200
0126115407WC	STRATUS CLOUDING	26 TO 29	81	29.80	7	STRATUS CLOUDING	30 TO 33	82	29.12	10	85.6	1500
0126121408WC	STRATUS CLOUDING	26 TO 29	81	29.80	7	STRATUS CLOUDING	30 TO 33	82	29.12	10	88.1	1500
0126131009WC	STRATUS CLOUDING	26 TO 29	82	29.80	7	STRATUS CLOUDING	30 TO 33	75	29.18	9	87.4	1500
0126133410WC	STRATUS CLOUDING	26 TO 29	82	29.80	7	STRATUS CLOUDING	30 TO 33	75	29.18	9	87.0	1500
0126140811WC	STRATUS CLOUDING	26 TO 29	84	29.82	7	STRATUS CLOUDING	30 TO 33	78	29.18	10	85.9	1300
0126142812WC	STRATUS CLOUDING	26 TO 29	84	29.82	7	STRATUS CLOUDING	30 TO 33	78	29.18	10	82.7	1300
0126153413NC	STRATUS CLOUDING	26 TO 29	85	29.85	8	STRATUS CLOUDING	30 TO 33	78	29.18	9	99.0	1500
0126155814NC	STRATUS CLOUDING	26 TO 29	87	29.89	7	STRATUS CLOUDING	26 TO 29	81	29.25	10	100.0	1200
0126162215WC	STRATUS CLOUDING	26 TO 29	87	29.89	7	STRATUS CLOUDING	26 TO 29	81	29.25	10	89.7	1200
0127103603WC	STRATUS CLOUDING	30 TO 33	75	30. 2	9	STRATUS CLOUDING	30 TO 33	78	29.27	10	91.0	3500
0127105604WC	STRATUS CLOUDING	30 TO 33	68	29.98	9	STRATUS CLOUDING	30 TO 33	83	29.37	9	92.5	3500
0127112005WC	STRATUS CLOUDING	30 TO 33	68	29.98	9	STRATUS CLOUDING	30 TO 33	83	29.37	9	91.7	3500
0127114006WC	STRATUS CLOUDING	30 TO 33	68	29.98	9	STRATUS CLOUDING	30 TO 33	83	29.37	9	84.9	3500
0127120607WC	RAIN, CUM CLOUD	34 TO 37	70	29.98	8	STRATUS CLOUDING	30 TO 33	85	29.37	10	90.9	4500
0127122608WC	RAIN, CUM CLOUD	34 TO 37	70	29.98	8	STRATUS CLOUDING	30 TO 33	85	29.37	10	91.7	4500
0127125009WC	HAZY	34 TO 37	70	29.98	8	SLEET	30 TO 33	85	29.37	10	91.9	4500
0127131210WC	STRATUS CLOUDING	34 TO 37	70	29.98	8	SLEET	30 TO 33	85	29.37	10	93.2	5500
0127140012WC	STRATUS CLOUDING	34 TO 37	72	29.94	7	LIGHT SNOW	34 TO 37	85	29.24	9	94.7	5K
0127142613WC	STRATUS CLOUDING	34 TO 37	72	29.94	7	LIGHT SNOW	34 TO 37	85	29.24	9	96.1	5K
0127144614WC	STRATUS CLOUDING	34 TO 37	72	29.94	7	LIGHT SNOW	34 TO 37	85	29.24	9	98.0	5K
0128102602WC	STRATUS CLOUDING	38 TO 41	59	30. 3	10	STRATUS CLOUDING	34 TO 37	74	29.40	8	76.1	10K
0128115005WC	STRATUS CLOUDING	38 TO 41	71	30. 6	8	STRATUS CLOUDING	34 TO 37	74	29.40	8	83.1	7K
0128124008WC	STRATUS CLOUDING	38 TO 41	69	29.98	8	STRATUS CLOUDING	34 TO 37	72	29.40	14	82.7	7K
0128135611WC	STRATUS CLOUDING	38 TO 41	55	29.86	13	STRATUS CLOUDING	38 TO 41	62	29.11	11	77.1	7K
0128142012WC	STRATUS CLOUDING	38 TO 41	65	29.86	13	STRATUS CLOUDING	38 TO 41	62	29.11	11	76.2	7K
0128144213WC	STRATUS CLOUDING	38 TO 41	65	29.86	13	STRATUS CLOUDING	38 TO 41	62	29.11	11	76.7	7K
0128151014WC	STRATUS CLOUDING	38 TO 41	62	29.77	18	STRATUS CLOUDING	38 TO 41	62	29.11	8	81.5	4500
0128153015WC	STRATUS CLOUDING	38 TO 41	62	29.77	18	STRATUS CLOUDING	38 TO 41	62	29.11	8	80.5	4500
0129100001WC	STRATUS CLOUDING	38 TO 41	89	29.61	8	STRATUS CLOUDING	34 TO 37	89	28.97	10	86.0	1K
0129114606WC	STRATUS CLOUDING	38 TO 41	85	29.61	7	STRATUS CLOUDING	34 TO 37	89	28.97	10	86.2	1K

TEST	WEATHER (RECEIVE SITE)	TEMP DEGREES F.	REL HUM PERCENT	BARO PRES INCHES MERCURY	WIND SPEED KNOTS	WEATHER (TRANSMIT SITE)	TEMP DEGREES F.	REL HUM PERCENT	BARO PRES INCHES MERCURY	WIND SPEED KNOTS	SIGNAL STRG -DBM	CLOUD LEVEL FEET
0129124009WC	STRATUS CLOUDING	34 TO 37	89	29.59	7	STRATUS CLOUDING	34 TO 37	93	28.97	11	[illegible]	800
0129130410WC	RAIN, STAT CLOUD	34 TO 37	93	29.60	9	STRATUS CLOUDING	34 TO 37	93	28.98	12	90.7	600
0129141413WC	RAIN, STAT CLOUD	34 TO 37	93	29.60	9	STRATUS CLOUDING	34 TO 37	93	28.98	12	97.1	600
0129150015WC	RAIN, STAT CLOUD	34 TO 37	85	29.60	11	STRATUS CLOUDING	34 TO 37	88	28.98	11	96.6	1K
0129154017WC	RAIN, STAT CLOUD	34 TO 37	85	29.60	11	STRATUS CLOUDING	34 TO 37	88	28.98	11	91.3	1K
0129165619WC	STRATUS CLOUDING	34 TO 37	89	29.68	9	STRATUS CLOUDING	34 TO 37	93	29. 2	12	87.7	1K
0129174021WC	STRATUS CLOUDING	34 TO 37	89	29.68	9	STRATUS CLOUDING	34 TO 37	93	29. 2	12	89.0	1K
0129184224WC	STRATUS CLOUDING	34 TO 37	85	29.68	9	STRATUS CLOUDING	34 TO 37	88	29. 2	13	90.5	1K
0129194426WC	RAIN, STAT CLOUD	34 TO 37	85	29.70	8	STRATUS CLOUDING	34 TO 37	85	29. 7	15	92.4	1K
0129202628WC	STRATUS CLOUDING	34 TO 37	85	29.70	8	STRATUS CLOUDING	34 TO 37	85	29. 7	15	92.9	1K
0129213031WC	RAIN, STAT CLOUD	34 TO 37	82	29.72	10	STRATUS CLOUDING	34 TO 37	85	29. 7	17	95.3	1100
0129220032WC	STRATUS CLOUDING	34 TO 37	83	29.70	9	STRATUS CLOUDING	34 TO 37	81	29.15	15	97.0	1000
0202160001WC	STRATUS CLOUDING	42 TO 45	76	29.40	7	STRATUS CLOUDING	38 TO 41	93	28.71	9	99.4	3300
0202170604WC	STRATUS CLOUDING	38 TO 41	85	29.47	5	STRATUS CLOUDING	38 TO 41	93	28.71	8	93.6	1700
0202181607WC	RAIN, STAT CLOUD	38 TO 41	89	29.37	7	STRATUS CLOUDING	38 TO 41	93	28.71	9	95.3	1600
0203115603WC	HEAVY SNOW	10 TO 13	88	29.70	9	HAZY	10 TO 13	83	29.11	16	86.8	500
0203124005WC	HEAVY SNOW	10 TO 13	88	29.70	9	HAZY	10 TO 13	83	29.11	16	88.8	500
0203134407WC	HEAVY SNOW	10 TO 13	88	29.69	13	HAZY	6 TO 9	76	29. 7	12	94.7	400
0203143009WC	HEAVY SNOW	10 TO 13	88	29.68	15	HAZY	10 TO 13	69	29. 7	12	90.1	400
0204115401WC	STRATUS CLOUDING	2 TO 5	57	30.26	8	STRATUS CLOUDING	6 TO 9	48	29.53	13	94.8	2K
0204131403WC	CLEAR	2 TO 5	52	30.26	8	STRATUS CLOUDING	10 TO 13	46	29.55	15	92.3	
0204140005WC	CLEAR	2 TO 5	45	30.27	10	STRATUS CLOUDING	10 TO 13	48	29.55	14	90.3	

TEST RECORD
PORT BYRON, FEBRUARY

X-BAND

TEST	RECEIVE SITE WEATHER	RECEIVE SITE TEMP DEGREES F.	RECEIVE SITE REL HUM PERCENT	RECEIVE SITE BARO PRES INCHES MERCURY	RECEIVE SITE WIND SPEED KNOTS	TRANSMIT SITE WEATHER	TRANSMIT SITE TEMP DEGREES F.	TRANSMIT SITE REL HUM PERCENT	TRANSMIT SITE BARO PRES INCHES MERCURY	TRANSMIT SITE WIND SPEED KNOTS	SIGNAL STRG -DBM	CLOUD LEVEL FEET
0210111003WX	LIGHT SNOW	34 TO 37	93	29.71	5	STRATUS CLOUDING	34 TO 37	90	29.11	4	102.0	400
0210121006WX	LIGHT SNOW	34 TO 37	89	29.73	5	LIGHT FOG	34 TO 37	90	29. 8	8	102.3	400
0210125008WX	LIGHT SNOW	34 TO 37	89	29.73	5	LIGHT FOG	34 TO 37	90	29. 8	8	105.4	400
0210133010WX	LIGHT SNOW	34 TO 37	89	29.71	5	LIGHT FOG	34 TO 37	90	29. 5	7	107.0	400
0210142011WX	LIGHT SNOW	34 TO 37	92	29.67	7	LIGHT SNOW	34 TO 37	88	29. 5	11	106.9	400
0210155215WX	LIGHT SNOW	34 TO 37	92	29.62	8	LIGHT SNOW	34 TO 37	89	28.99	10	110.4	400
0212105003WX	LIGHT SNOW	10 TO 13	80	29.84	10	STRATUS CLOUDING	14 TO 17	71	29.20	14	108.6	2K
0212123008WX	CUMULUS CLOUDING	14 TO 17	74	29.84	14	STRATUS CLOUDING	14 TO 17	71	29.20	13	109.3	2K
0212132010WX	CUMULUS CLOUDING	14 TO 17	72	29.87	16	STRATUS CLOUDING	18 TO 21	65	29.18	12	108.5	2K
0217105002WX	SIRUS CLOUDING	18 TO 21	57	30. 2	5	STRATUS CLOUDING	22 TO 25	71	29.36	14	99.9	1100
0217124407WX	SIRUS CLOUDING	26 TO 29	51	30. 2	4	STRATUS CLOUDING	26 TO 29	58	29.36	14	99.1	1200
0217132009WX	SIRUS CLOUDING	30 TO 33	49	30. 0	3	STRATUS CLOUDING	30 TO 33	58	29.34	15	91.9	1200
0217143012WX	SIRUS CLOUDING	34 TO 37	38	29.99	1	STRATUS CLOUDING	30 TO 33	58	29.34	15	94.8	1200
0217153815WX	SIRUS CLOUDING	30 TO 33	47	29.99	0	STRATUS CLOUDING	30 TO 33	64	29.32	12	97.6	1200
0217160016WX	SIRUS CLOUDING	30 TO 33	47	29.99	0	STRATUS CLOUDING	30 TO 33	64	29.32	12	97.6	1200
0218065401WX	SIRUS CLOUDING	26 TO 29	51	29.75	7	CUMULUS CLOUDING	34 TO 37	61	29. 5	14	101.4	10K
0218075402WX	SIRUS CLOUDING	30 TO 33	58	29.75	6	CUMULUS CLOUDING	34 TO 37	61	29. 5	15	99.8	10K
0218083604WX	SIRUS CLOUDING	30 TO 33	56	29.75	6	CUMULUS CLOUDING	34 TO 37	61	29. 5	15	105.6	10K
0218093006WX	SIRUS CLOUDING	34 TO 37	50	29.69	13	CUMULUS CLOUDING	38 TO 41	54	29. 5	10	104.9	10K
0218105009WX	SIRUS CLOUDING	38 TO 41	53	29.68	13	CUMULUS CLOUDING	42 TO 45	42	28.96	14	105.5	10K
0218110610WX	SIRUS CLOUDING	42 TO 45	47	29. 2	12	CUMULUS CLOUDING	42 TO 45	51	28.96	14	104.9	10K
0218113011WX	SIRUS CLOUDING	42 TO 45	47	29. 2	12	CUMULUS CLOUDING	42 TO 45	51	28.96	14	100.9	10K
0218122614WX	SIRUS CLOUDING	46 TO 49	45	28.99	11	CUMULUS CLOUDING	46 TO 49	51	28.96	18	103.0	10K
0218131216WX	SIRUS CLOUDING	46 TO 49	44	28.94	10	CUMULUS CLOUDING	46 TO 49	51	28.91	17	104.6	10K
0218135018WX	SIRUS CLOUDING	46 TO 49	44	28.94	10	CUMULUS CLOUDING	46 TO 49	51	28.91	17	103.4	10K
0218143020WX	SIRUS CLOUDING	50 TO 53	46	28.95	3	CUMULUS CLOUDING	46 TO 49	49	28.91	20	104.4	10K
0218151022WX	SIRUS CLOUDING	46 TO 49	49	28.93	3	CUMULUS CLOUDING	42 TO 45	53	28.91	15	105.7	12K
0218162024WX	SIRUS CLOUDING	46 TO 49	46	28.93	6	CUMULUS CLOUDING	42 TO 45	55	29.88	14	102.1	12K
0218163825WX	SIRUS CLOUDING	46 TO 49	46	28.93	6	CUMULUS CLOUDING	42 TO 45	55	29.88	14	101.7	12K
0218172427WX	SIRUS CLOUDING	46 TO 49	49	28.92	8	CUMULUS CLOUDING	42 TO 45	57	29.88	13	99.8	12K
0218182029WX	SIRUS CLOUDING	42 TO 45	55	28.92	9	CUMULUS CLOUDING	38 TO 41	65	29.88	11	104.1	12K
0218190031WX	SIRUS CLOUDING	42 TO 45	55	28.92	10	CUMULUS CLOUDING	38 TO 41	70	28.86	8	100.6	12K
0218194033WX	SIRUS CLOUDING	42 TO 45	55	28.92	10	CUMULUS CLOUDING	38 TO 41	70	28.86	8	101.4	12K
0218202635WX	CUMULUS CLOUDING	42 TO 45	50	28.91	8	CUMULUS CLOUDING	38 TO 41	65	28.66	12	107.8	4600
0219100002WX	LIGHT SNOW	18 TO 21	84	29.86	12	CUMULUS CLOUDING	14 TO 17	74	29.22	15	108.3	1K
0219103003WX	LIGHT SNOW	18 TO 21	84	29.86	12	CUMULUS CLOUDING	14 TO 17	74	29.22	15	107.7	1K
0219111205WX	LIGHT SNOW	18 TO 21	77	29.86	9	CUMULUS CLOUDING	14 TO 17	74	29.22	14	103.9	2K
0219115607WX	LIGHT SNOW	18 TO 21	73	29.90	10	CUMULUS CLOUDING	18 TO 21	71	29.22	12	107.7	1800
0219123209WX	LIGHT SNOW	18 TO 21	73	29.90	10	CUMULUS CLOUDING	18 TO 21	71	29.22	12	106.1	1800
0219131011WX	LIGHT SNOW	18 TO 21	70	29.90	12	CUMULUS CLOUDING	18 TO 21	65	29.28	13	107.4	1800
0219140013WX	LIGHT SNOW	14 TO 17	73	29.93	11	CUMULUS CLOUDING	18 TO 21	55	29.28	15	108.3	2K
0224093001WX	CLEAR	34 TO 37	64	29.91	14	CLEAR	34 TO 37	69	29.24	17	100.9	
0224101003WX	CUMULUS CLOUDING	34 TO 37	64	29.93	12	CLEAR	34 TO 37	72	29.24	17	105.0	12K
0224105005WX	CUMULUS CLOUDING	34 TO 37	64	29.90	12	CLEAR	34 TO 37	72	29.24	17	104.9	12K
0224111006WX	CUMULUS CLOUDING	34 TO 37	64	29.90	18	CUMULUS CLOUDING	34 TO 37	70	29.22	14	106.1	2500
0224122009WX	CUMULUS CLOUDING	38 TO 41	64	29.90	18	CUMULUS CLOUDING	34 TO 37	70	29.22	14	105.7	2500
0224130011WX	CUMULUS CLOUDING	38 TO 41	64	29.80	13	CUMULUS CLOUDING	38 TO 41	73	29.18	15	104.1	2500

TEST	WEATHER	RECEIVE SITE TEMP DEGREES F.	REL HUM PERCENT	BARO PRES INCHES MERCURY	WIND SPEED KNOTS
0224140012WX	CUMULUS CLOUDING	38 TO 41	64	29.77	15
0224144014WX	CUMULUS CLOUDING	38 TO 41	64	29.77	15
0224150015WX	CUMULUS CLOUDING	38 TO 41	64	29.77	16
0225083001WX	LIGHT SNOW	26 TO 29	74	29.67	14
0225102006WX	LIGHT SNOW	22 TO 25	68	29.72	14
0225110408WX	LIGHT SNOW	18 TO 21	77	29.73	22
0225115010WX	LIGHT SNOW	18 TO 21	77	29.73	22
0225124012WX	LIGHT SNOW	18 TO 21	77	29.77	25
0225133014WX	CUMULUS CLOUDING	14 TO 17	77	29.80	18
0225142216WX	LIGHT SNOW	10 TO 13	64	29.83	15
0225150418WX	LIGHT SNOW	10 TO 13	64	29.85	20
0225154620WX	LIGHT SNOW	10 TO 13	64	29.85	20
0226070003WX	CUMULUS CLOUDING	-2 TO .1	79	30. 8	5
0226081006WX	CUMULUS CLOUDING	-2 TO .1	65	30. 9	7
0226084007WX	CUMULUS CLOUDING	2 TO 5	65	30. 9	7
0226092009WX	CUMULUS CLOUDING	2 TO 5	65	30. 9	7
0226102011WX	CUMULUS CLOUDING	6 TO 9	65	30. 9	7

TEST	WEATHER	TRANSMIT SITE TEMP DEGREES F.	REL HUM PERCENT	BARO PRES INCHES MERCURY	WIND SPEED KNOTS	SIGNAL SIRG -DBM	CLOUD LEVEL FEET
0224140012WX	CLEAR	38 TO 41	73	29.16	18	99.3	2500
0224144014WX	CLEAR	38 TO 41	73	29.16	18	99.3	2500
0224150015WX	CLEAR	38 TO 41	73	29.15	18	100.8	1500
0225083001WX	HEAVY SNOW	26 TO 29	60	29. 6	18	109.4	1500
0225102006WX	HEAVY SNOW	22 TO 25	75	29.12	18	107.2	1500
0225110408WX	HEAVY SNOW	14 TO 17	68	29.17	20	110.1	1500
0225115010WX	HEAVY SNOW	14 TO 17	68	29.17	20	110.4	1500
0225124012WX	LIGHT SNOW	14 TO 17	62	29.22	17	107.7	1500
0225133014WX	STRATUS CLOUDING	14 TO 17	59	29.25	23	103.9	1500
0225142216WX	STRATUS CLOUDING	10 TO 13	64	29.27	20	108.4	2K
0225150418WX	LIGHT SNOW	10 TO 13	67	29.30	18	108.0	2K
0225154620WX	LIGHT SNOW	10 TO 13	67	29.30	18	109.3	2K
0226070003WX	STRATUS CLOUDING	2 TO 5	80	29.42	14	103.1	4K
0226081006WX	STRATUS CLOUDING	2 TO 5	80	29.42	14	108.5	
0226084007WX	STRATUS CLOUDING	6 TO 9	80	29.42	14	107.8	
0226092009WX	STRATUS CLOUDING	10 TO 13	81	29.43	13	109.3	15K
0226102011WX	STRATUS CLOUDING	10 TO 13	74	29.42	12	111.6	17K

TEST RECORD
PORT HURON, FEBRUARY

C-BAND

TEST	WEATHER	RECEIVE SITE TEMP DEGREES F.	REL HUM PERCENT	BARO PRES INCHES MERCURY	WIND SPEED KNOTS	WEATHER	TRANSMIT SITE TEMP DEGREES F.	REL HUM PERCENT	BARO PRES INCHES MERCURY	WIND SPEED KNOTS	SIGNAL STRG -DBM	CLOUD LEVEL FEET
0210111003WC	LIGHT SNOW	34 TO 37	93	29.71	5	STRATUS CLOUDING	34 TO 37	90	29.11	4	101.1	400
0210113004WC	LIGHT SNOW	34 TO 37	93	29.71	5	STRATUS CLOUDING	34 TO 37	90	29.11	4	99.4	400
0210121006WC	LIGHT SNOW	34 TO 37	89	29.73	5	LIGHT FOG	34 TO 37	9?	29. 8	8	100.0	400
0210125008WC	LIGHT SNOW	34 TO 37	89	29.70	5	LIGHT FOG	34 TO 37	90	29. 8	8	107.4	400
0210133010WC	LIGHT SNOW	34 TO 37	89	29.71	5	LIGHT FOG	34 TO 37	90	29. 5	7	110.8	400
0210142011WC	LIGHT SNOW	34 TO 37	89	29.71	5	LIGHT SNOW	34 TO 37	9?	29. 5	7	108.5	400
0210151013WC	LIGHT SNOW	34 TO 37	92	29.64	7	LIGHT SNOW	34 TO 37	92	29. 0	8	107.8	400
0210155215WC	LIGHT SNOW	34 TO 37	92	29.62	8	LIGHT SNOW	34 TO 37	83	28.99	10	109.8	400
0212095001WC	LIGHT SNOW	10 TO 13	84	29.83	12	STRATUS CLOUDING	10 TO 13	74	29.19	15	99.1	2K
0212115006WC	SLEET	14 TO 17	77	29.84	15	STRATUS CLOUDING	14 TO 17	71	29.20	15	98.1	2K
0212123008WC	SLEET	14 TO 17	74	29.84	14	STRATUS CLOUDING	14 TO 17	71	29.20	13	98.1	2K
0212132010WC	SLEET	14 TO 17	72	29.83	16	STRATUS CLOUDING	18 TO 21	65	29.18	12	102.3	2K
0213120004WC	LIGHT SNOW	6 TO 9	63	30.11	14	STRATUS CLOUDING	10 TO 13	64	29.40	13	105.9	3K
0213122205WC	LIGHT SNOW	6 TO 9	63	30.11	14	STRATUS CLOUDING	10 TO 13	64	29.40	13	104.7	3K
0213130607WC	LIGHT SNOW	6 TO 9	57	30.12	12	STRATUS CLOUDING	10 TO 13	64	29.44	10	104.4	3K
0217105002WC	SIFUS CLOUDING	18 TO 21	57	30. 2	5	STRATUS CLOUDING	22 TO 25	71	.36	14	91.3	1100
0217120005WC	SIFUS CLOUDING	26 TO 29	51	30. 2	4	STRATUS CLOUDING	26 TO 29	58	36	14	89.8	1200
0217124407WC	SIFUS CLOUDING	26 TO 29	51	30. 2	4	STRATUS CLOUDING	26 TO 29	58	29.36	14	89.3	1200
0217132009WC	SIFUS CLOUDING	30 TO 33	49	30.	3	STRATUS CLOUDING	30 TO 33	58	29.36	14	84.1	1200
0217143012WC	SIFUS CLOUDING	34 TO 37	38	29.99	1	STRATUS CLOUDING	30 TO 33	58	29.34	15	85.3	1200
0217153815WC	SIFUS CLOUDING	30 TO 33	47	29.99	0	STRATUS CLOUDING	30 TO 33	64	29.32	12	87.0	1200
0218065401WC	SIFUS CLOUDING	26 TO 29	51	29.75	7	CUMULUS CLOUDING	34 TO 37	61	29. 5	14	92.3	10K
0218075402WC	SIFUS CLOUDING	30 TO 33	58	29.75	6	CUMULUS CLOUDING	34 TO 37	61	29. 5	14	84.8	10K
0218083604WC	SIFUS CLOUDING	30 TO 33	58	29.75	6	CUMULUS CLOUDING	34 TO 37	61	29. 5	14	90.9	10K
0218091005WC	SIFUS CLOUDING	34 TO 37	50	29.60	13	CUMULUS CLOUDING	38 TO 41	54	29. 5	10	93.7	10K
0218105009WC	SIFUS CLOUDING	38 TO 41	53	29.69	13	CUMULUS CLOUDING	42 TO 45	47	28.96	14	95.6	10K
0218110610WC	SIFUS CLOUDING	42 TO 45	47	29. 2	12	CUMULUS CLOUDING	42 TO 45	51	28.96	14	95.0	10K
0218113011WC	SIFUS CLOUDING	42 TO 45	47	29. 2	12	CUMULUS CLOUDING	42 TO 45	51	28.96	14	92.1	10K
0218122614WC	SIFUS CLOUDING	46 TO 49	45	28.90	11	CUMULUS CLOUDING	46 TO 49	51	28.96	18	91.7	10K
0218131216WC	SIFUS CLOUDING	46 TO 49	44	28.94	10	CUMULUS CLOUDING	46 TO 49	51	28.91	17	94.6	10K
0218135018WC	SIFUS CLOUDING	46 TO 49	44	28.94	10	CUMULUS CLOUDING	46 TO 49	51	28.91	17	95.4	10K
0218143020WC	SIFUS CLOUDING	50 TO 53	46	28.95	3	CUMULUS CLOUDING	46 TO 49	49	28.91	20	94.8	10K
0218151022WC	SIFUS CLOUDING	46 TO 49	49	28.93	3	CUMULUS CLOUDING	42 TO 45	53	28.91	15	97.2	12K
0218162024WC	SIFUS CLOUDING	46 TO 49	46	28.93	6	CUMULUS CLOUDING	42 TO 45	55	29.88	14	91.6	12K
0218163825WC	SIFUS CLOUDING	46 TO 49	46	28.93	6	CUMULUS CLOUDING	42 TO 45	55	29.88	14	91.8	12K
0218172427WC	SIFUS CLOUDING	46 TO 49	49	28.92	8	CUMULUS CLOUDING	42 TO 45	57	29.88	13	90.5	12K
0218182029WC	SIFUS CLOUDING	42 TO 45	55	28.92	9	CUMULUS CLOUDING	38 TO 41	65	29.88	11	98.9	12K
0218190031WC	SIFUS CLOUDING	42 TO 45	55	28.92	10	CUMULUS CLOUDING	38 TO 41	70	28.86	8	96.3	12K
0218194033WC	SIFUS CLOUDING	42 TO 45	55	28.92	10	CUMULUS CLOUDING	38 TO 41	70	28.86	8	97.1	12K
0218202635WC	CUMULUS CLOUDING	42 TO 45	50	28.91	8	CUMULUS CLOUDING	38 TO 41	85	28.86	12	103.3	4600
0218210037WC	CUMULUS CLOUDING	42 TO 45	57	28.91	7	CUMULUS CLOUDING	38 TO 41	73	28.86	9	101.9	4600
0219093001WC	LIGHT SNOW	22 TO 25	84	29.83	12	CUMULUS CLOUDING	14 TO 17	74	29.22	15	99.0	1K
0219103003WC	LIGHT SNOW	18 TO 21	84	29.83	12	CUMULUS CLOUDING	14 TO 17	74	29.22	15	96.0	1K
0219111205WC	LIGHT SNOW	18 TO 21	77	29.84	9	CUMULUS CLOUDING	14 TO 17	74	29.22	14	94.3	2K
0219115607WC	LIGHT SNOW	18 TO 21	73	29.90	10	CUMULUS CLOUDING	18 TO 21	71	29.22	12	94.8	1800
0219123209WC	LIGHT SNOW	18 TO 21	73	29.90	10	CUMULUS CLOUDING	18 TO 21	71	29.22	12	92.3	1800
0219131011WC	LIGHT SNOW	18 TO 21	70	29.90	12	CUMULUS CLOUDING	18 TO 21	65	29.28	13	92.4	1800

TEST	RECEIVE SITE WEATHER	RECEIVE SITE TEMP DEGREES F.	RECEIVE SITE REL HUM PERCENT	RECEIVE SITE BARO PRES INCHES MERCURY	RECEIVE SITE WIND SPEED KNOTS	TRANSMIT SITE WEATHER	TRANSMIT SITE TEMP DEGREES F.	TRANSMIT SITE REL HUM PERCENT	TRANSMIT SITE BARO PRES INCHES MERCURY	TRANSMIT SITE WIND SPEED KNOTS	SIGNAL STRG -DBM	CLOUD LEVEL FEET
0219140013*C	LIGHT SNOW	14 TO 17	73	29.93	11	CUMULUS CLOUDING	18 TO 21	65	29.28	15	94.0	2K
0224093001*C	CLEAR	34 TO 37	64	29.91	14	CLEAR	34 TO 37	69	29.24	17	94.0	
0224101003*C	CUMULUS CLOUDING	34 TO 37	64	29.90	12	CLEAR	34 TO 37	72	29.24	17	96.2	12K
0224105005*C	CUMULUS CLOUDING	34 TO 37	64	29.90	12	CLEAR	34 TO 37	72	29.24	17	94.0	12K
0224111006*C	CUMULUS CLOUDING	34 TO 37	64	29.90	18	CUMULUS CLOUDING	34 TO 37	70	29.22	14	94.3	2500
0224122009*C	CUMULUS CLOUDING	38 TO 41	64	29.90	18	CUMULUS CLOUDING	34 TO 37	70	29.22	14	95.6	2500
0224130011*C	CUMULUS CLOUDING	38 TO 41	64	29.80	13	CUMULUS CLOUDING	38 TO 41	73	29.18	15	94.7	2500
0224140012*C	CUMULUS CLOUDING	38 TO 41	64	29.77	15	CLEAR	38 TO 41	73	29.16	18	90.8	2500
0224142013*C	CUMULUS CLOUDING	38 TO 41	64	29.77	15	CLEAR	38 TO 41	73	29.16	18	90.3	2500
0224144014*C	CUMULUS CLOUDING	38 TO 41	64	29.77	15	CLEAR	38 TO 41	73	29.16	18	91.3	2500
0224150015WC	CUMULUS CLOUDING	38 TO 41	64	29.77	16	CLEAR	38 TO 41	73	29.15	18	91.8	1500
0225083001WC	LIGHT SNOW	26 TO 29	74	29.67	14	HEAVY SNOW	26 TO 29	6?	29. 6	18	102.1	1500
0225092003WC	LIGHT SNOW	22 TO 25	74	29.70	16	HEAVY SNOW	22 TO 25	66	29. 9	18	105.7	1500
0225102006WC	LIGHT SNOW	22 TO 25	68	29.72	14	HEAVY SNOW	18 TO 21	75	29.12	18	99.2	1500
0225110408WC	LIGHT SNOW	18 TO 21	77	29.73	22	HEAVY SNOW	14 TO 17	68	29.17	20	102.8	1500
0225115010WC	LIGHT SNOW	18 TO 21	77	29.73	22	HEAVY SNOW	14 TO 17	68	29.17	20	104.0	1500
0225124012*C	LIGHT SNOW	18 TO 21	77	29.77	25	LIGHT SNOW	14 TO 17	62	29.22	17	99.0	1500
0225133014WC	CUMULUS CLOUDING	14 TO 17	77	29.80	18	STRATUS CLOUDING	14 TO 17	59	29.25	23	95.5	1500
0225142216WC	LIGHT SNOW	10 TO 13	64	29.83	15	STRATUS CLOUDING	10 TO 13	64	29.27	20	99.2	2K
0225150418*C	LIGHT SNOW	10 TO 13	64	29.83	15	LIGHT SNOW	10 TO 13	64	29.27	20	99.6	2K
0225154420*C	LIGHT SNOW	10 TO 13	64	29.83	15	LIGHT SNOW	10 TO 13	64	29.27	20	99.9	2K
0226062001WC	CUMULUS CLOUDING	-2 TO .1	79	30. 7	4	LIGHT SNOW	2 TO 5	76	29.43	14	98.0	400
0226070003WC	CUMULUS CLOUDING	-2 TO .1	79	30. 8	5	STRATUS CLOUDING	2 TO 5	80	29.42	14	93.8	4K
0226075005WC	CUMULUS CLOUDING	-2 TO .1	79	30. 8	5	STRATUS CLOUDING	2 TO 5	80	29.42	14	98.2	4K
0226084007WC	CUMULUS CLOUDING	2 TO 5	65	30. 9	7	STRATUS CLOUDING	6 TO 9	80	29.42	14	97.9	
0226092009WC	CUMULUS CLOUDING	2 TO 5	65	30. 9	7	STRATUS CLOUDING	10 TO 13	81	29.43	13	98.9	15K
0226102011WC	CUMULUS CLOUDING	6 TO 9	65	30. 9	7	STRATUS CLOUDING	10 TO 13	74	29.42	12	102.0	17K
0226124012WC	CUMULUS CLOUDING	10 TO 13	65	30. 9	7	STRATUS CLOUDING	18 TO 21	65	29.35	15	101.0	1500

REFERENCES

1. Booker, H. G. and Gordon W. E., "A Theory of Radio Scattering in the Troposphere," Proc IRE, Vol 38, pp 401-412, April, 1950

2. Friis, H. T., Crawford, A. B. and Hogg, D. C., "A Reflection Theory for Propagation Beyond the Horizon," BSTJ, Vol 36, pp 627-644, April 1957

3. Rice, S. O., "Statistical Fluctuations of Radio Field Strength for Beyond the Horizon," Pro IRE, Vol 40, pp 274-281, February 1953

4. Sunde, E.O., "Digital Troposcatter Transmission and Modulation Theory, BSTJ, Vol 43, pp 144-214, Jan 1964

5. Bello, P. A. Ehrman, L., Crystal, T. H., "Troposcatter Multi Channel Digital Systems Study", RADC-TR-67-218, Final Report, May 1967, AD 817211

6. Branham, R. A., Manders, A. M., Kozakoff, D. J., "Correlation Bandwidth Measurements over Troposcatter Paths," First Interim Report ECOM-0251-1, Martin Marietta Corporation, August 1969

7. Crawford, A. B., Hogg, D. C., and Kummer, W. H., "Studies in Tropospheric Propagation Beyond-the-Horizon," Bell Systems Tech J., Vol 38, pp 1067-1178, September 1959

8. Hirai, M., Fukushima, M.., Kurihara, Y., "Correlation Between Amplitudes of Radio Waves of Different Frequencies in UHF Beyond-the-Horizon Propagation", Jour of Radio Res Las Japan, Vol 7, No. 33, pp 509-529, Sept 1960

9. Gordon, W. E., Interpretation of Diversity and Fading Measurements in Tropospheric Radio Scattering, URSI, Washington, D.C., April 1953

10. O. A. Tagliaferri and the Radio Meterological Test Committee, "Support to DCA Tropospheric Scatter Tests", Tech rep No. RADC-TR-66-609 Rome, N. Y., Oct 1966

11. Bean, B. R., Dutton, E. J., Radio Meteorology, NBS Monograph 92, 1966

12. Longley, A.G., Rice, P.L., "Prediction of Tropospheric Radio Transmission Loss Over Irregular Terrain: A Computer Method," 1968, ESSA Tech Report ERL 79-IRS 67, July 1968

13. Davies, K., "Ionospheric Radio Propagation," NBS Monograph 80, p 163, 1965

14. McGavin, R.E., "A Survey of the Techniques for Measuring the Radio Refractive Index," NBS Tech Note 99, May 1962

15. Branham, R., Manders, A., Brummett, B., "Correlation Bandwidth Measurements Over Troposcatter Paths," Third Interim Report ECOM-0251-3, Martin Marietta Corp., February 1970

16. Barrow, B., Abraham, L.G., Cowan, Jr., W.M., and Gallant, R.M., "Indirect Atmospheric Measurements Utilizing Rake Tropospheric Scatter Techniques - Part I; The Rake Tropospheric Scatter Technique:, Proc IEEE Vol 57 No. 4 pp 537-551, April 1969

17. Birkemeier, W.P., Merrill, H.S., Sargeane, Jr., D.H., Thomson, D.W., Beamer, C.M., and Bergeman, G.T., "Observation of Wind-Produced Doppler Shifts in Troposhperic Scatter Propagation," Radio Science, Vol 3, No. 4, pp 309-317, April 1968

18. Haurwitz, B., "Dynamic Meteorology,"McGraw-Hill, 1941

19. Misme, P., "The Correlation Between the Electric Field at a Great Distance and a New Radio-Meteorological Parameter," Trans IRE AP 6, 289, July 1958

20. Branham, R.A., Manders, A.M., Kozakoff, D.J., Brummett, B., "Correlation Bandwidth Measurements Over Troposcatter Paths," Second Interim Report ECOM-0251-2, Martin Marietta Corporation, November 1969

21. Branham, R.A., Manders, A.M., Reinstatler, R., "Troposcatter Transmission of High Speed Digital Signals," Tech Rep ECOM-0042-F, Martin Marietta Report OR-9733, Martin Marietta Corp., Orlando, Florida, December 1968

22. RACEP and AN/TRC-66 (XW-1) FM Troposcatter Systems Tests, Martin Marietta Report OR-2662, July-August 1962

23. Correlation Bandwidth Measurement Proposal, Martin Marietta Report OR-9864p, January 1969

24. Bello, P. A., Ehrman, L., Arnstein, D. S., "Modeling and Data Analysis - Short and Medium Range Digital Troposcatter Tests", RADC-TR-69-233, Final Report, October 1969, AD-862236.

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13. ABSTRACT

This is the final report on Correlation Bandwidth Measurements Over Troposcatter Paths. The report covers a literature search and analysis of identifiable factors that affect correlation bandwidth, and also discusses the field measurement program. The objective of this program was to obtain data necessary for the design of troposcatter modems for use in future MALLARD troposcatter systems.

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